The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Position of Synthetic Fertilisers

IN the last few months much information has been published in regard to the growth of the synthetic nitrogenous fertilisers industry. Developments are occurring so rapidly that it has become very difficult indeed to take a bird's-eye view of the industry as a whole. A very interesting review of the situation as regards its economic aspects appeared recently in *Nature*, under the title of "Production and Use of Synthetic Nitrogenous Fertilisers." The article is unsigned, but is obviously written by a well-informed authority. One of the most interesting points raised is the question of the security of the British home market for synthetic nitrogen compounds; "it appears highly probable that Synthetic Ammonia and Nitrates, Ltd., will come to an arrangement with the German Nitrogen Syndicate whereby spheres of influence will be defined and selling prices will be fixed and adjusted in ways advantageous to both." But should such an arrangement fail to transpire, then "competitive ability will depend upon quality, manner of marketing, production costs, selling policy and salesmanship." One of the most important points is the lowering of overhead costs by extending sales. The appointment by Synthetic Ammonia and Nitrates, Ltd., of Sir Frederick Keeble to take charge of research into the application of synthetic nitrogenous compounds to agriculture and to direct propaganda shows that the English producers are fully alive to the needs of the situation.

It is quite clear that the much-criticised British farmer is going to have a considerable voice in determining the future of the British industry of synthetic nitrogen compounds. There is in this country room for an enormous increase in the use of fertilisers. The contingent advantages of the increased use would include not only the benefit derived by a new industry, but also, it is to be hoped, some reduction of the importation of certain foodstuffs. But this desirable state of affairs can only be brought about by the co-operation of the chemist, the fertiliser manufacturer, the farmer, and the biologist. It will be necessary to study a large number of factors affecting plant growth, to develop plant species which will give the best possible yields, and to provide special synthetic fertilisers to meet special cases. In regard to this latter point, the Germans have already produced certain special articles (Leunaphos, etc.), and doubtless the British producers will not fail to watch carefully this phase of the matter. In regard to biologists, we have nothing to fear; the work of Sir Reginald Biffen on wheat is a sufficient indication that biological talent, as regards agricultural application, is not lacking in this country.

The writer in *Nature* deals also with the chemists' view of the subject. With expansion of the world's demand for fertilisers "we may expect the chemical industry to occupy a more prominent place in the industrial world than it does to-day, and even the chemist may receive that meed of recognition for which he has been striving so long. In Germany to-day it is openly said that the I.G.—the enormous combine of chemical manufacturers—*is* the Government. If Great Britain is to hold her own in the world's markets, better men must be attracted to the profession and industry of chemistry by offering more adequate rewards." And so say all of us!

The Bankers' Manifesto

WE publish elsewhere in this issue a statement which has been circulated to the Press entitled "A Plea for the Removal of Restrictions upon European Trade." We regard it as an announcement of first class importance, possibly the biggest thing which has been done for trade since the armistice. This manifesto, urging the removal of those excessive restrictions on trading activities which still prevail as a result of the war, is signed by the leading bankers and great industrialists of the principal countries of Europe. The British list includes the signatures of the Governor of the Bank of England and the chairmen of other great banking corporations, the heads of shipbuilding, shipowning, textile, and other firms. Among the

German representatives is the President of the Reichsbank, and France is prominently represented by M. Chas. Sergent, chairman of the Committee of Experts who are dealing with the reform of French finance. In Italy, Czecho-Slovakia, Austria, Holland, Belgium, Switzerland, and Scandinavia, the manifesto has been signed by prominent and representative bankers and industrialists. While the manifesto is of the first importance on account of the weight which attaches to such signatures, it is no less remarkable on account of the sanity of the text itself. The following phrase is typical: "There can be no recovery in Europe till politicians in all territories old and new realise that trade is not war, but a process of exchange, that in time of peace our neighbours are our customers, and that their prosperity is a condition of our well-being."

While the bankers from the nature of their business see the effect of hampering restrictions on credit, currency and exchange, in a big publishing enterprise, such as that of which THE CHEMICAL AGE is a part, we have been conscious, as a result of our day-by-day association with the difficulties of individual industries, that there can be no real revival of trade in Europe until the artificial barriers set up as a result of the seething passions of war are done away with. So convinced were we of the truth of this, that ten years ago our Chairman founded *The European Commercial*, and published it in Vienna, distributing through this medium, as widely as possible, propaganda directed towards the breaking down of restrictions on trade and the rebuilding of practical and profitable business relationships between the various countries of Europe. It is, therefore, with peculiar gratification that we realise that the prolonged effort that we made in this direction has not been without result; to-day, the best-known bankers and men of business throughout Europe, reviewing the problem with the greatest impartiality, are pleading for the abolition of restrictions which interfere with trade and prevent it from flowing in its natural channels.

Advances in Rubber Chemistry

OUR remarks in these columns last week in connection with the discussion on synthetic rubber which took place at the recent conference of chemists in America have prompted a correspondent to point out that some of the other developments in rubber chemistry which came under review were even more important than those to which we referred. Among other things, our correspondent draws attention to the paper read by Dr. Philip Schidrowitz—probably the best known authority on rubber problems—which dealt with the direct use of rubber latex, with special reference to vulcanised latex. It appears that Dr. Schidrowitz has succeeded in vulcanising latex with ordinary flowers of sulphur without heat and pressure—an unsuspected reaction. This opens up the possibility of many industrial uses for vulcanised latex, especially the manufacture of dipped goods, and rubberised fabrics. At the same conference, Dr. G. L. Clark described interesting researches on the structure of rubber. He revealed the utility of X-rays in experimental chemistry, particularly as applied to crystal structure, and the identification of colloids. Although a structural formula for rubber has not been fixed, it is hoped that this long-outstanding question will be answered before long. Crystalline rubber has not been produced in any laboratory. Plummerer claimed to have made it, but he apparently was unaware of the exact conditions which promote crystal formation.

It would appear from another paper by Mr. J. W. Bicknell, that rubber planters now rely on botanical science. The scientist has certainly come into his own since root disease, falling leaves, and white ants affected rubber trees. At the moment there exist considerable variations in methods of tree propagation, irrigation, tapping, and fertilisation. Although the quantity of latex produced does not vary appreciably with the method of tapping the reaction of the raw rubber to vulcanisation is dependent on rest periods, and this would seem to reveal that the latex composition has some bearing upon whether the tree is tapped continuously, or at rest. At present the average yield per acre per year is about 600 lb., but with continued scientific methods, and increasing knowledge, it is not improbable that this yield will be considerably exceeded. It will be interesting to watch the further progress which scientific methods and application bring to bear on this industry.

Gasworks and Ammonia Oxidation

IN both chemical and commercial circles the influence which synthetic nitrogen compounds will ultimately have upon the market for by-product ammonia and Chilean nitrate has for some time now been an outstanding topic of conversation. So far as Chilean nitrate is concerned the subject invariably seems to be approached from the fertiliser standpoint, and the solution looked for lies in the opportunity which exists for an immense expansion in the world consumption of artificial plant foods. A consideration, however, which seems to have escaped any great amount of attention is the effect which the ever-increasing production of synthetic ammonia is likely to have upon the use of Chilean nitrate for the manufacture of nitric acid, large quantities of which, as is well known, are required in a variety of industries. This is an important point to which attention is called in the current issue of our American contemporary, *Industrial and Engineering Chemistry*, where it is also pointed out that a large gas undertaking in America has arranged (instead of marketing its by-product ammonia as ammonia liquor or in the anhydrous form) to erect plant for the oxidation of the ammonia to nitric acid and to supply a neighbouring chemical works with the latter product. It appears that the oxidation plant is not yet completed, but, according to our contemporary, careful calculations based upon abundant experience have indicated a marked economy in the production of nitric acid as well as a satisfactory outlet for the gas undertaking's ammonia. Thus, the gas company is relieved from entering competitive markets in which it formerly had to deal.

It is, perhaps, remarkable that processes of ammonia oxidation, with which the names of Ostwald and Brauer, Frank and Caro, and Kaiser are so intimately associated, have not received greater attention from the commercial point of view than has been the case. The explanation probably lies in the fact that in nearly all countries attention has primarily been focused upon

synthetic ammonia production, and the firm establishment of this industry has been regarded as a necessary preliminary to the second step, namely, nitric acid production. It is known, of course, that a plant for the oxidation of ammonia was set in operation at an important chemical works in the north some time ago, and although we drew attention to this piece of enterprise at the time, very little seems to have since been divulged as to the working of the plant.

As to the adoption of the process by gas undertakings, it must be borne in mind that in technical practice it has been found more convenient not to use ammonia gas, but a purified ammonia liquor containing, say, 25 per cent. of ammonia. The whole process seems, moreover, to be comparatively straightforward, although several instances of catalyst poisoning have been recorded by those who have worked on it, the principal drawback appearing to be the sulphur compounds present in gasworks ammonia. The future of sulphate of ammonia so far as prices are concerned is decidedly indefinite, but the day may yet come when some of the larger gas undertakings decide to turn their hand to ammonia oxidation as a more profitable outlet for one of their main by-products. As with every other process, however, the decision must depend upon the solution of any technical difficulties (and these would appear to be few) and, more important still, upon the financial aspects of the process as compared with the production of sulphate of ammonia.

Gypsum and Anhydrite

WITH the introduction of methods for the utilisation of anhydrite in the manufacture of ammonium sulphate many questions have been asked recently concerning the availability of supplies, and the possibility of a rapid exhaustion of the material. It is known that in the Carlisle district and in Durham and Nottinghamshire there are large supplies of anhydrite available. Indeed, some beds have recently been discovered which are phenomenal in point of thickness and the readiness with which the material can be wrought. It is certain, in fact, that no fear need be entertained about a shortage during the next thirty years, even if the present consumption be increased to 100,000 tons per year. There can be no doubt that anhydrite is much more suitable as a raw material in the manufacture of ammonium sulphate than is gypsum. Not only is there a large content of calcium sulphate, but the material appears to be more readily susceptible to reaction with ammonium carbonate or ammonium bicarbonate than is gypsum.

There is still plenty of opportunity for the improvement of methods in the manufacture of gypsum. The present calcination process is not all that can be desired, besides which, it is not inconceivable that the treatment after calcination is capable of considerable improvement. The advent of the rotary calciner in America has, we understand, produced revolutionary results, and the adoption of such a type of plant can be commended to English manufacturers. Another practice which has recently come into general use in the United States is the adoption of automatic bagging machines, which dispense with a hitherto disagreeable job, and result in considerable economy, due to the avoidance of dust.

Books Received

ANNUAL TABLES OF CONSTANTS AND NUMERICAL DATA. Vol. V., 1917-1922. Part II. Paris: Gauthier-Villars et Cie. Pp. 1200.

POTASH: A REVIEW, ESTIMATE AND FORECAST. By J. W. Turrentine, Ph.D. New York: John Wiley. London: Chapman and Hall. Pp. 188. 15s.

VOLUME ALTERATIONS ON AND IN SOLUTION. By Frank L. Teed. London: H. K. Lewis and Co., Ltd. Pp. 62. 3s. 6d.

NATURAL AND SYNTHETIC RESINS. By T. Hedley Barry, Alan A. Drummond, and R. S. Morrell. London: Ernest Benn, Ltd. Pp. 196. 21s.

PRACTICAL COLLOID CHEMISTRY. By Wolfgang Ostwald, with the collaboration of Dr. P. Wolski and Dr. A. Kuhn. Translated by I. Newton Kugelmass and Theodore K. Cleveland. London: Methuen and Co., Ltd. Pp. 192. 7s. 6d.

The Calendar

Oct. 25	Institute of Chemistry (Manchester Section): "The Chemist and the Community." Professor G. G. Henderson.	Manchester.
26	University of Birmingham Chemical Society: Presentation of prizes and Lecture entitled, "The Relation between Chemical Constitution and Physiological Action." Professor J. B. Cohen.	University, Birmingham.
26	Institute of Chemistry and Society of Chemical Industry, Edinburgh Sections: "Costs in Industry." W. A. Williams. 7.30 p.m.	36, York Place, Edinburgh.
27	Society of Chemical Industry, Newcastle-on-Tyne Section: "The Management of a Chemical Works: What It Implies." A. Rudge. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
27	Faraday Society: "Beryllium." A. C. Vivian. And other papers by F. I. G. Rawlins, J. Colvin, Freda M. Hunter, J. J. Hedges, A. N. Campbell, T. Carlton Sutton, R. H. Humphry and R. S. Jane, J. S. Dunn, and A. C. Chatterji and N. R. Dhar. 8 p.m.	Burlington House, Piccadilly, London.
27	Society of Chemical Industry, South Wales Section. "Anti-knock Compounds. C. M. Grieb. 7.30 p.m.	Technical College, Mount Pleasant, Swansea.
28	Chemical Society: Hugo Müller Lecture by Professor S. P. L. Sorensen. 8 p.m.	Institution of Mechanical Engineers, Storey's Gate, London.
28	Institute of Metals (Birmingham Section): "Fatigue." Professor D. Hanson. 7 p.m.	Engineers' Club, Waterloo Street, Birmingham.
28	Birmingham Metallurgical Society, Staffordshire Iron and Steel Institute and Birmingham Section of Institute of Metals: "Fatigue." Professor D. Hanson. 7 p.m.	Engineers' Club, Waterloo Street, Birmingham.
29	Institute of Chemistry (Glasgow and West of Scotland Section): Annual General Meeting.	
29	Manchester Literary and Philosophical Society: Chemical Section.	Manchester.
30	British Association of Chemists: Annual Dinner. 6.30 p.m.	Adelphi Hotel, Liverpool.
30	Finsbury Technical College Old Students' Association: Fifteenth Annual Dinner.	Engineers' Club, London.
30	Institute of Metals. (North-East Coast Section): Joint meeting with the Institute of British Foundrymen. 6.15 p.m.	Neville Hall, Newgate Road, Newcastle-on-Tyne.
Nov. 3	Institution of Chemical Engineers: Annual Presidential Reception. 8.30 p.m.	Gallery of the Royal Society of Painters in Water Colour, 5a, Pall Mall East, London.
11	Institute of Chemistry (Liverpool and N.W. Section): Annual General Meeting.	St. George's Restaurant, Redcross St., Liverpool.

Industrial Chemicals From the Sea

G. Malcolm Dyson, Ph.D., A.I.C.

Although some of the methods, used in earlier times, of producing certain substances from marine sources have fallen into disuse, it seems possible that by proper scientific handling such methods might still be commercially profitable. Dr. Dyson's article, published below, is of special interest on this account.

THE production of raw materials for chemical and other industries from sea water and its vegetation is practised on a far larger scale than most chemists realise. In this country we are so accustomed to mining our salt and importing our iodides and potash that there is but little evidence of any activity in the preparation of these substances from the sea. In America, Southern France, and Japan, however, very large quantities of both organic and inorganic chemicals are produced from this source. Thus, for example, certain of the Pacific States obtain more than 95 per cent. of their salt from sea water, and in 1917 the production of "solar salt" in the U.S.A. was well over 2,500,000 barrels.

The necessity for the use of salt in daily life, as well as in industrial operations is, of course, a well established fact; and the original source of salt in the earliest times was sea water. Agricola mentions it, and we have the evidence of a Chinese manuscript of 1000 B.C. that the evaporation of sea water was resorted to for the preparation of this essential of diet. Industrially, salt is of fundamental importance in nearly all industries and is used as an antiseptic and preservative, in refrigeration, for the production of dyes, soda, hydrochloric acid, chlorates, perchlorates, bleaching powder, soaps, etc., and, in short, may be described as the fundamental source of all chlorine compounds.

Solid Matter in Sea Water

The sea contains about 3·3 to 3·7 per cent. of solid matter in solution, of which an average analysis is: Cl, 55·206; Br, 0·174; SO_4, 7·783; CO_3, 0·226; Na, 30·577; K, 1·14; Rb, 0·04; Ca, 1·286; Mg, 3·613; Fe, SiO_2, PO_4, NO_2, etc., 0·05. In addition to those mentioned in the above analysis there are small traces of other compounds. The presence of gold in sea water has attracted considerable attention, but since the amount is only from 10 to 20 mg. per ton, its presence is not a matter of economic importance. The bulk of the dissolved matter in sea water is, obviously, sodium chloride, and it has been calculated that if the whole of this compound contained in the sea were removed it would occupy a space of four and a half million cubic miles. The production of salt from sea-water can be performed in one of two basic methods of which there are, naturally, many modifications. The salt percentage of the sea may be concentrated by freezing out pure water, until saturated brine alone remains, which can then be evaporated in pans, or the water can be evaporated *ab initio* by the aid of solar heat. The former process is practised to some extent in Norwegian salteries, but the latter method is the more common and is still practised to a considerable extent in countries where long periods of tropical or semi-tropical sun are available. Two things are necessary for the production of solar salt to be economical: firstly, the necessary heat, and secondly, a series of bays or lagoons which can be easily filled at high tide, and in which the evaporation can take place. Further, such basins must have an impervious lining so that loss by seepage and infiltration is reduced to a minimum. Where the natural bottom is not sufficiently reliable in this respect, a layer of puddled clay is used to give the necessary imperviousness.

In certain of the Oriental salteries the sea water is sprayed over heaps of loose earth, upon which evaporation takes place very rapidly. When sufficient saline matter has collected the whole heap is leached with hot water, and the resulting solution evaporated. In modern French and American salt pans the sea water is pumped by wind power into large concreted basins, to a depth of three inches. Under favourable weather conditions the basin will be dry in from five to six days, when another layer of water is pumped in and successive charges of water are evaporated until a thick crust of impure salt is obtained, which can be dug out, washed with a little water and dried in the sun. Often, in actual practice, a whole set of bays is arranged, and the concentrated brine from three units of one set is pumped, or allowed to flow, into one unit of the next set, so that approximately the same depth of liquid is present in all the bays. In this way a fair bulk of liquid is present in the final bays where the actual salt is deposited, and the crystals of the latter can be easily fished out. This process avoids the contamination of the salt with the evaporated mother liquor, and so ensures a purer product.

There are several reasons which make it imperative that the crude "solar salt" should be purified before it is used for many purposes. In the first place the size of the crystals, or their shape may be unsuitable, while the colour of the raw salt is frequently brown or deep red owing to the presence of certain bacteria or traces of iron or decomposing organic matter. For domestic or dairy use the taste, which is bitter on account of the calcium and magnesium salts present, and the smell, which is like that of the sea, are objectionable, and the presence of deliquescent salts renders damping and caking of the crude salt inevitable. An analysis of crude salt obtained from a Spanish salt lagoon gave the following constituents: Chloride, 59·34; sodium, 38·02; sulphate, 1·727; calcium, 0·471; magnesium, 0·396; silica and gangue, 0·086; bicarbonate (HCO_3), 0·013; bromine, 0·008; tetraborate, trace. Most salt is purified by solution in water and evaporation in special vessels termed "grainers," although for certain purposes clean sea salt can be pulverised, washed with brine, and sifted. The shape of the salt crystals produced in the evaporation is of fundamental importance in the salt industry. If a solution of salt is left to evaporate slowly small cubic crystals separate at the surface. As these grow larger they indent the surface and since evaporation proceeds rapidly at the surface the crystal develops mainly along the four top edges, giving, finally, a large irregular crystal in the shape of a hollow pyramid. Such a process is shown diagrammatically in Fig. 1 and leads to the formation of the well-known "hopper" crystal.

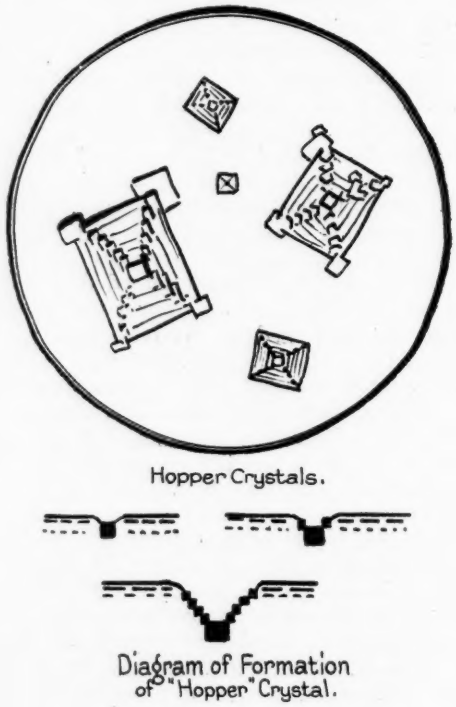

FIG. 1.

These crystals on reaching a certain size fall to the bottom of the container, and intercrystallisation having set in, a large mass of solid salt is produced. Hopper crystals may reach several inches in length and aggregates weighing many tons

can be produced in this way. Such salt has but little commercial value (save as " bay-salt " in meat curing) since the liability to powder and the irregular shape of the grains are undesirable qualities.

Three processes are available for the production of a fine grained table salt with good " pouring " qualities. The simplest process is to evaporate brine in a vacuum pan when the violent ebullition allows small rounded cubical grains only to be deposited. Such crystals (magnified 25 diameters) are shown in Fig. 2, and although of excellent quality generally, are not so well favoured for general domestic use as those prepared by the second method. This method, known as " flash graining," consists in allowing the saturated brine to superheat under pressure, and then to expand suddenly into a cooled chamber. Crystals, quite of a distinctive character (see Fig. 2), are deposited which " pour " extremely well. The drawback to the vacuum pan and " flash-grainer " processes lies in the elaborate plant required, and the cost

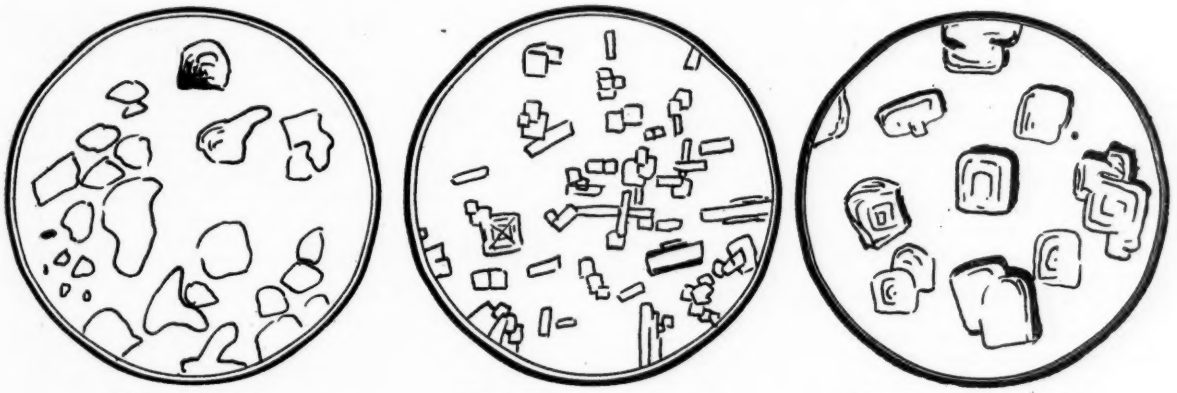

FIG. 2.

of the fuel, and a third process has been worked out in order to obtain a marketable quality of salt from the solar salt directly. In the first place very careful regulation of the evaporation of the ponds is necessary to avoid, as far as possible, contamination with impurities. The solar salt is crushed and screened under an alkaline brine, a process which removes the calcium and magnesium salts and other soluble impurities. The salt is collected in two qualities, a very fine salt (" fish-salt ") for curing purposes and a coarse grained salt. This latter is washed with brine containing a little ultramarine to brighten the colour and is then dried at 88° to 98° C. Further crushing and screening then gives a salt (Fig. 2) composed of comparatively large sized and irregular grains. It has only a moderate pouring quality, which is enhanced by the addition of about 1 per cent. of magnesium carbonate, or 1½ per cent. of air-floated talcum powder. At one time anhydrous sodium carbonate was used for this purpose, but solar salt so treated developed an objectionable sea odour, in view of which this addition has been discontinued.

The coarse or " bay-salt " when ground is used to a large extent in meat curing, while the coarse-grained salt obtained by evaporation finds use in cooking and preserving. The fine and flash grained salt is utilised mainly as table salt on account of its pouring qualities, and the very fine or " dust " salt is used in the dairy industry for the salting of butter, and in the chemical industry.

By-Products from Solar Salt

The bulk of by-products which might be obtained from the " bitterns " or mother-liquors of the solar salt industry are wasted. In 1921 the value of the bromine alone, which was run to waste, totalled £200,000, a fact which is partly due to the lack of initiative on the part of the producers and partly, perhaps, to the lack of facilities for transporting the liquors to a central station for treatment. Analysis of two bitterns, the first from the Oliver Salt Works, Mt. Eden, California, the second from the Leslie Salt Refining Works, San Mateo, showed the following constituents :—

	No. 1.	No. 2.
Potassium chloride	10·49	4·90
Sodium chloride	3·04	57·92
Calcium sulphate	0·84	1·25
Magnesium chloride	65·77	24·½
Magnesium sulphate	19·04	10·66
Magnesium bromide	0·58	1·06

Balard in 1880 devised a process for obtaining potassium chloride and magnesium sulphate from bittern. Briefly, his process consists in the concentration of the bittern to a specific gravity of 1·30 to 1·33, at which concentration a mixed salt separates out consisting of almost equivalent proportions of sodium chloride and magnesium sulphate. This is worked up by dissolving in water, and allowing to crystallise during cold weather, under which circumstances almost pure hydrated sodium sulphate separates out and is removed. Evaporation of the original mother liquor after the deposition of the mixed salt, followed by standing in the cold, gives a deposit of nearly pure magnesium sulphate, which is converted to sodium sulphate by double decomposition, while the mother liquor on further evaporation deposits an impure carnallite $MgCl_2.KCl.6H_2O$. The end liquor containing magnesium chloride and bromide was discarded. Such a process, conducted as it was with natural evaporation and cooling, was very tedious. A more modern method is as follows :—The bittern is evaporated until its specific gravity is 1·32, during which a certain amount of impure salt separates. On cooling the clear liquor the " mixed salt " of Balard separates, is filtered off, dissolved in water, and cooled by refrigerated brine to —6° C. The strength of the solution is so adjusted that its specific gravity is 1·30, when hydrated sodium sulphate separates. This is converted to the anhydrous sodium sulphate by warming with 45 per cent. of its weight of mixed salt at 80° C., when the hydrous sodium sulphate gives up its water to the mixed salt, and on filtering and centrifuging a sodium sulphate containing about 5 per cent. of water and almost free from magnesium is obtained. The filtrate from the deposition of the mixed salt is further evaporated and cooled to 12° C., when magnesium sulphate is deposited and is filtered off. The liquid which has by this time a specific gravity of 1·30 is evaporated in pans until crystals begin to form, when evaporated end liquor containing a high percentage of magnesium chloride is run in and the whole allowed to cool. Carnallite containing only about 20 per cent. of potash separates out and is washed with mother liquor from a previous batch which removes magnesium chloride and leaves a mixture of carnallite and magnesium chloride containing 65 to 85 per cent. of potassium chloride. The sodium sulphate finds use industrially, and the magnesium chloride liquor is used for the production of magnesium oxychloride and of jointless flooring.

The bromine accumulates in the end-liquors as magnesium bromide, and can be obtained therefrom by allowing the liquor to trickle down a tower up which a stream of chlorine and warm air is passed. Bromine vapour passes over and is obtained partly by condensation and partly by scrubbing out with an inert organic solvent. An ingenious process has been devised and carried out successfully for the production of bromine directly from sea water. This, it may be added, has been stimulated by the high price and scarcity of ethyl bromide attendant upon its use in the production of lead tetraethyl. The process consists in electrolysing sea water with such a current density and such a rate of flow through the cell that the bromine only is liberated. If any chlorine is liberated it rapidly decomposes the bromide present to give the free bromine. The bromine is extracted by an organic solvent on the counter current principle, each extraction fluid being washed with alkali in which the bromine collects and is removed periodically. Since sea water contains only eight parts of bromine per 100,000 very accurate adjustment is necessary to obtain a suitable decomposition.

Iodine from Seaweed

Although at present iodine is obtained to a considerable extent from Chili saltpetre, the fact that sea vegetation has the ability to store up its element has given rise to a comparatively large industry in its extraction from this source. The seaweed burning industry in this country dates from about 1720, when potash for the manufacture of soap, lyes, alum, etc., was annually obtained therefrom to the extent of about £500,000 sterling. Towards the beginning of the nineteenth century the industry rapidly declined owing to the introduction of soda from other and cheaper sources, but in 1840 a revival of the industry took place owing to the discovery of iodine in the kelp. This removal was shortlived, for in 1872 iodine from saltpetre iodates were introduced and has been gradually extinguishing the older industry. The varieties of seaweeds differ very considerably in their iodine content, among the richest of those burnt on the Scottish coast being (figures are for percentage of I in dry weed) :— Laminaria digitata, 0·55 ; Laminaria stenophylla, 0·34 ; Laminaria saccharina, 0·28 ; Fucus serratus, 0·05 ; Fucus nodosus, 0·06 ; Fucus vesiculosus, 0·003. Thus, Laminaria digitata and stenophylla are considerably richer in iodine than the others and are consequently preferred. The amount of iodine obtained corresponds to about 50 lb. per ton with these weeds, but is usually very much less.

The " wrack," as the weed is called, is gathered and dried in the open. Two days are sufficient providing the weather is good, but the advent of rain is disastrous, since the bulk of the iodine is washed out thereby. Incineration among the Scots burners is of the most primitive kind, and in many places the weed is just burnt in heaps, although in others an attempt is made to convert it into a rock-like ash. For this purpose low rock kilns are built in which a small fire is kindled. The seaweed is added in bundles, each of which is completely burned and the ash rabbled before another bundle is added. Each day's burning gives a " floor of ashes " about three inches thick, and in a week some twenty or thirty inches of ash are accumulated. After the last burning, water is thrown on to the hot hearth, which breaks up the rock-like mass into convenient hard lumps, which are easily extracted and sent to the works. An average analysis of kelp ashes shows the following composition (per cent.) : mineral matter (water soluble), 61·12 ; mineral matter (insol. in water, sol. in HCl), 27·71 ; siliceous residue, 11·10 ; iodine, 14 lb. per ton ; halogen (calculated as Cl), 24·72 ; Potash (K_2O), 13·48 ; soda (Na_2O), 11·26 ; sulphur trioxide, 9·82 ; sulphur as sulphide, 1·01.

The somewhat obvious improvement of dry distillation of the weed has been practised in the northern islands of Scotland, and is at the present time used to a certain small extent in America. It has the following advantages. The iodine recovered is almost 100 per cent. of that present in the weed, while in addition more potash is obtained ; no troublesome sulphide is produced as in kelp burning, while by-product ammonia, gas, tar, acetic acid, and charcoal tend to increase the commercial value of the process. On the other hand, the disadvantages comprise haulage to a central plant for treatment, heavy fuel charges, and the utilisation of skilled labour. It is probable that with careful regulation of details the process could still be made to pay in Scotland.

In France the kelp (" varec ") is obtained by simple burning, but in Japan great attention is paid to the matter. The weed harvesting is systematic and on a strictly commercial basis, and the burning is done in carefully regulated kilns. The weeds differ from the varieties used in the European industry and include Ecklonia cava, E. Bicyclis, Sargassum, Laminaria Japonica, and L. Ochotensis, the ash of which latter contains from 0·2 to 1 per cent. of iodine. The analysis of a weed or its ash for iodine does not, however, furnish a very good guide to its utility in the kelp industry since the iodine content varies very considerably with the time of year. The nature of the iodine compounds and their function in seaweed is a much discussed problem. Usually a certain part of the element is present as the inorganic halide, although not, as a rule, more than 10 per cent., except in such cases as Turba fusiformis, where it may rise to 20 per cent. The soluble organic compounds of iodine account for another

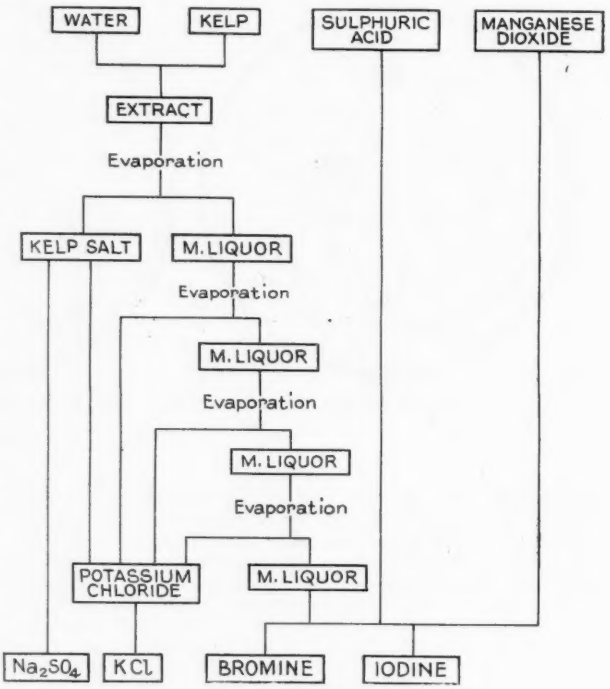

FIG. 3. THE SCOTTISH PROCESS.

60–70 per cent., although in Ecklonia cava the amount may rise to 80 per cent. The remaining iodine is present in some insoluble organic form.

There are two main processes by which the ashes are worked up into pure chemicals, the Scottish and the French. In the Scottish process the ash is lixiviated in a manner very similar to that used for black ash, and the liquor is then evaporated, during which process a rough or " kelp " salt separates out containing about 50–60 per cent. of potassium sulphate and chloride. The filtered liquor on cooling deposits crystals of potassium chloride, while further evaporations and coolings yield several more crops of the same substance. The tail-liquor is heated with manganese dioxide and sulphuric acid and the bromine and iodine collected successively. In the French process the iodine is separated by an ingenious plan early in the operations. The extracted liquor is neutralised with sulphuric acid, in which process sulphur is deposited, and the filtered liquid is treated with copper sulphate which precipitates the iodine as cuprous iodide, which is filtered off and converted into pure iodine. The mother liquor from the iodine precipitation is evaporated and fractionally crystallised and yields both pure potassium chloride and kainite. In Figs. 3 and 4 these processes are illustrated by the aid of flow sheets.

Devillers has recently introduced a process in which the iodine is extracted from the weed without incineration. The weed is washed with water when 80 per cent. of the iodine is removed as soluble compounds. This iodine is precipitated as cuprous iodide. The precipitate so obtained is very finely divided and is coagulated with tannin or gelatin and removed by sedimentation. This process is at present being used by the Société Industrielle de l'Algue Marine.

Potash from Seaweed

The extraction of potash from seaweed, as has already been stated, was the foundation of the Scottish kelp industry, and was revived in that country and America when wartime conditions cut off supplies of potash from more favourable sources. It has, however, not survived, although it has been authoritatively stated that provided enough weed was handled and an adequate disposal of the bye-products could be obtained, the process could even now be worked profitably. Much potash was obtained during the war years in America from this source as the following figures, obtained from the U.S. Geological Survey (1917), show (figures in short tons) :— From sea water, 39,716 ; from kelp, 4,804 ; from distillers' waste, 3,476 ; from alunite, 2,621 ; from dust from cement kilns, 1,549 ; from wood ashes, 1,213 ; from Steffens' water waste, 643 ; from various sources, 529.

The particular seaweeds favoured in the United States for the production of potash are a species of " giant " kelps of which great masses grow on the Pacific coast, especially about San Diego. The varieties include Pelagophycus porra, Macrosystis pyrifera, Alaria fistulosa, etc. Growths of Macrosystis pyrifera are said to attain 1,000 feet in length. The weed is harvested mechanically by underwater cutters working on the same principle as that of the hay-cutting machine. The growths are raked on board and chopped into very small pieces, so that the slurry of wet weed can be handled by suction.

Some plants merely dry the weed in horizontal rotary driers heated by oil-burners. The dried kelp can be used *per se*, or in admixture as a manure, since it contains about 15 per cent. of potash, mainly as potassium chloride. It has been shown, also, that the odd 2 per cent. of nitrogen slowly becomes available. Simple incineration of the kelp is scarcely ever practised in America, the more usual process being

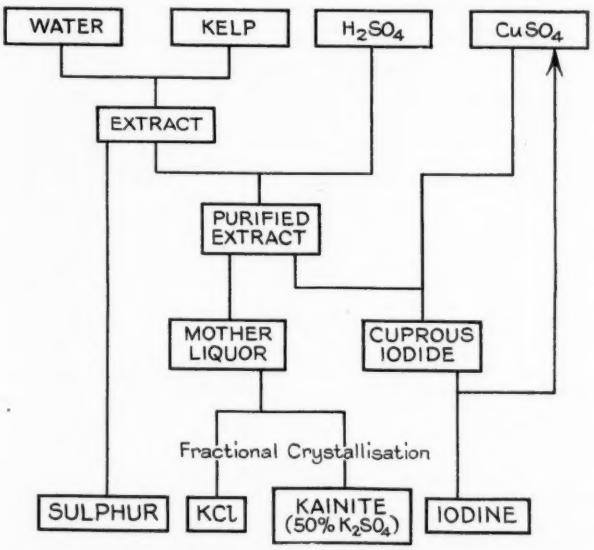

FIG. 4. THE FRENCH PROCESS.

destructive distillation. In this operation gas ammonia and tar are produced, together with a creosote of high phenol content. The extraction residue of the ashes gives a valuable decolorising carbon, whilst the soluble matters furnish potash and iodine. A quantity flow sheet of this process is given below in Fig. 5. In practice the air dried kelp is further dried in kilns, compressed into bales, and distilled in vertical fireclay retorts at about 800° C. The gas which is obtained serves for heating the retorts, and the usual train of scrubbing and purifying plant is used for the extraction of the by-products.

The most outstanding modern improvement in processes for dealing with seaweed is that operated by the Hercules Powder Co., in which the weed is fermented. The weed is harvested in the usual way, chopped, and passed into tanks containing about 50,000 gallons, where the sludge is inoculated with cultures of the appropriate bacteria and allowed to remain for two weeks. During this period the slowly increasing amounts of acid in the fermentation vats are gradually neutralised with lime, and when at the end of the period nearly all the solid has gone into solution the whole batch is neutralised and filtered. The clear solution is evaporated in a Kestner 4 effect evaporator. The substances which separate out during evaporation are, firstly, a mixture of calcium acetate, propionate, butyrate, valerate, etc. These are converted straightway into the corresponding ethyl esters with

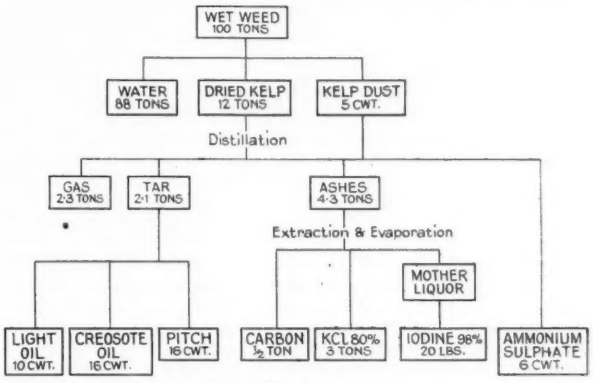

FIG. 5.

ethyl alcohol and sulphuric acid, and the solvent esters so produced are separated by fractional distillation. The next product to separate is a mixture of calcium acetate and potassium chloride, which is distilled as obtained for acetone and acetone oil, the residue yielding potassium chloride on extraction. The concentrated liquor after the separation of these substances finally gives crystals of potassium chloride, whilst from the mother-liquor iodine is prepared by decomposition with chlorine.

Edible Seaweeds

A not inconsiderable industry has been built up in the preservation of seaweeds and their extracts. Seaweed is eaten to some extent in the British Isles, both pink and green " laverbread " (Porphyria lacinata and Ulva latissima) being esteemed a delicacy in South Wales. The Japanese consume much seaweed, and over a hundred varieties are in use as foodstuffs. The principal seaweed product of this nature with which the chemical industry is concerned is agar-agar, which finds use not only in food manufacture but also for the manufacture of soap powders, thickeners, medicinally as a laxative, and for clarification. In actual fact, it is the bleached and purified extract of certain red algæ found principally in the Eastern seas. The best Japanese agar is obtained from Gelidum corneum, Camphylophora hypnoeus and certain varieties of Gracilaria. It has the useful property of giving a stiff gel at concentrations of one-half per cent. in water. An analysis of Japanese agar showed (per cent.) :— Moisture, 16·57 ; protein, 2·34 ; nitrogen free extract (gelose), 76·15 ; ether extract, 0·30 ; fibre, 0·80 ; ash, 3·85 ; silica, 0·68. The advisability of adding agar-agar in any considerable extent to foodstuffs has been much discussed. Its carbohydrate is less easily digested by the enzymes of the digestive tract than that of any other food preparation.

A curious industry has arisen in Japan in the preparation from seaweed of the sodium salt of glutamic acid. This substance has a strong meat-like taste, and, mixed with salt, is considerably used in Japan as a condiment. Its exact method of preparation from seaweed is a secret process, although several methods for its preparation have been covered by letters patent. Quite recently it has been found easier and simpler to obtain it from beet sugar residues.

Cyanide from the Air

Combining Atmospheric Nitrogen

An account of methods of combining atmospheric nitrogen as cyanide, written by Dr. Bruno Waeser, has recently appeared in *Die Metallborse*. Dr. Waeser states that as far back as 1828, Defosses observed that nitrogen was taken up by charcoal saturated with alkali solution at a suitable temperature, the product being a cyanide of the alkali. Since that time numerous efforts have been made to make technical use of this reaction; the greater proportion of these have failed and only a few have attained any importance. It is of interest, however, to note that the search for a good cyanide synthesis has resulted in the well-known calcium nitride process.

During the war J. C. Buchner carried out large scale experiments in America on synthetic cyanide production with indifferent results, and in Sweden Th. Thorssell also carried out experimental work on these lines without satisfactory conclusions. The American experiments, formerly carried on at Saltville and Niagara Falls, are no longer being continued, and the A.B. Kväfeindustrie in Bohus near Göteberg in Sweden formed to work Thorssell's process went into liquidation in 1922. Nevertheless the problem of finding an economic solution of the question has not been abandoned. In 1922 the N.V. Stickstoff-Bindungs-industrie, "Nederland," in Dordrecht, was formed to work a Hamburg process and is producing cyanide and ferrocyanide. In 1924 the offers of ferrocyanide by this company were made at prices which quite demoralised the German market in this material. Quantities of synthetic cyanide have been produced by the British Cyanide Co., and lately the Bucher processes have been employed by the California Cyanide Co. at Cudahy near Los Angeles, by which they are said to produce about 8 tons per day. However, the cyanide is not sold as such, but is decomposed by carbon dioxide to yield hydrocyanic acid for the destruction of vermin and also for plant protection, while the soda is recovered to be used over again in the process.

Review of Methods

These methods are based essentially on the following reaction: A mixture of sodium carbonate and carbon, in the presence of iron as a catalyst, is heated in air to a temperature of 900 to 1,000° C., which results in the production of sodium cyanide as indicated in the following equation:—

$$Na_2CO_3+4C+N_2=2NaCN+3CO.$$

The cyanide is leached out of the furnace product. The individual processes are distinguished only through the alkali used (potash, soda, or a mixture of the two) and the form (briquettes, powder, etc.) in which the components of the furnace charge are made to react with one another. From theoretical investigations it is known that the progress of the reaction is influenced by the intimate mixture of the components, the activity of the carbon used, and also by the rate of passage of the nitrogen over the heated material. It is also essential that moisture be absent, and that the reaction gases do not become too far enriched by carbon dioxide and monoxide. The cyanide production, under favourable conditions, amounts to 100 per cent., and in large scale working is complete in from 30 to 60 minutes, so that the heat expenditure is comparatively small. Besides alkalies, other basic materials, and particularly barium compounds such as the carbonate, at temperatures of 1,300–1,400° C. can be used. When barium carbonate is used the product is barium cyanide, while if the oxides of magnesium or aluminium are used, much higher temperatures are necessary and the products are nitrides. A compressed mixture of barium carbonate and a pure charcoal heated to 1,400° in a nitrogen stream for 15 minutes yields about 60 per cent. cyanide and cyanamide. The long continued attempts to produce formates, oxalates, oxamide, etc., from crude cyanide have not resulted in a commercial method. The synthetic processes are worked almost without exception for the production of refined cyanide or ferrocyanide, so far the crude cyanide is not used to produce hydrocyanic acid, or for the recovery of gold from its ores. They are already sufficiently developed and reliable to be adopted for local plants in California where the consumption of cyanogen for plant protection is considerable.

Synthetic cyanide production would appear to have little effective competition from the recovery of cyanide from gas purifying materials. The sodium metal and ammonia process of the "Scheideanstalt" is both complicated and somewhat dangerous to use. Important only is the calcium nitride process which is rapidly being developed in the United States, Germany, France, and Poland. The production of sodium cyanide from calcium nitride is usually carried out in an electric furnace and the reaction proceeds according to the following equation:—

$$C+CaCN_2+2NaCl=CaCl_2+2NaCN.$$

The sodium cyanide is often decomposed by boiling water under pressure to form ammonia according to the equation:—

$$2NaCN+4H_2O=Na_2CO_3+2NH_3+H_2+CO.$$

It has long been sought to manufacture ammonia cheaply in this way, but the process has not yet reached a commercial stage and in many quarters it is considered doubtful whether such a process could compete with the direct ammonia synthesis. However, if an alkali-carbon-iron mixture can be made to yield cyanide without pressure and in a short time interval, it would by no means be negligible as a competitive method of producing ammonia. The decomposition of the cyanide by boiling water yields hydrogen and carbon monoxide, as well as ammonia gas. These gases when burnt in air yield a mixture of steam, carbon dioxide and nitrogen. The two first are easily separated from the nitrogen which is thus available for use in the cyanide production stage. The heat required in the earlier stages is largely recoverable, and the carbon dioxide gas is also a by-product of value. The greatest difficulty is in regard to the soda recovery because it is in solution from which it must be recovered by the evaporation of the water. On account of this latter difficulty it has been proposed to use barium carbonate as a substitute for sodium carbonate and make barium cyanide. When this is boiled in water under pressure the barium carbonate formed at this stage is an insoluble product easily separated from the water and there is no evaporation problem involved. On the other hand, a temperature of about 1,300° C. is necessary in the cyanide-producing stage which calls for a larger fuel consumption than when an alkali carbonate is used.

Ammonia *via* Cyanide

The fact that the alkali cyanide synthesis is in commercial operation at three places at least, proves better than words that the furnace difficulties which hitherto have been the greatest obstacle to the success of the method have now been overcome. Irons highly resistant to the action of alkalies, and also suitable to withstand high working temperatures, have become available, and it has also been found how to make the charge porous and highly active in taking up nitrogen without either becoming fused or dough-like in consistency. Recent developments in these directions have given a new aspect to the problem of producing cheap ammonia by producing cyanide as an intermediate compound. In the year 1925 were published the results of the work of the two Japanese chemists, Ryosaburo Hara and Hikoziro Miura, in this field. These chemists experimented in producing cyanide from a mixture consisting of sodium sulphate, barium carbonate and carbon, with iron as a catalyst. The mixture, heated at 1,000° C. for 150 minutes in the air, yielded a quantity of cyanide corresponding to 85·5 per cent. of the sodium sulphate used and 4·6 per cent. as cyanamide. While the raw metal contained only cyanide with some cyanamide, it was noted that in a water solution a little ferrocyanide and thiocyanate had formed. With sodium chloride as the sodium salt with the same temperature and time, 72·3 per cent. of cyanide and 5 per cent. of cyanamide were obtained.

The author, Dr. Waeser, considers from his own experiments that the primary product formed is barium cyanamide which becomes converted into sodium cyanide. It is obvious that the barium used in the process is mainly recoverable. In the first reaction, with sodium chloride as the sodium salt, the water solution will contain both barium chloride and sodium cyanide. When this solution is boiled under pressure the products will be barium chloride, sodium chloride, and ammonia.

The Chemical Engineer

His Line of Development

DURING the course of a presidential address recently delivered by Mr. G. B. Jones, of the British Dyestuffs Corporation, to the Huddersfield Engineering Society, some interesting points in regard to chemical engineering were raised. Mr. Jones said that this was the youngest branch of the engineering profession, and he was afraid it was very much misunderstood in some directions. During the last few years the profession of chemical engineering had been inaugurated by the formation of the Institution of Chemical Engineers. The council of this body had defined a chemical engineer as a professional man experienced in the design, construction, and operation of plant and works in which matter underwent a change of state and composition.

General Knowledge Required

A chemical engineer should not be a highly specialised man, but one with a general knowledge of chemical reactions and physical laws combined with the principles of mechanical and electrical engineering. It was quite a mistake to think that a chemical engineer was either a chemist with some engineering knowledge or an engineer with some chemical knowledge; the development of modern scientific manufacture required a man with special training, for all men engaged on the technical side of modern manufacture had common knowledge and specialised knowledge. The common knowledge was becoming more and more based on physics, and he felt that a thorough knowledge of the physical laws, especially those relating to heat equations, was necessary. The drawings which were of course the essential province of the engineer formed another common meeting ground.

He made a plea that all students in technology should have sufficient training in mechanical drawing readily to understand drawings. Even business men and especially those engaged in public life should be able to read drawings intelligently. They were undoubtedly living in a highly developed mechanical age, and a man in almost any walk of life must at times find himself severely handicapped unless he could intelligently read a blue print. The ability to read drawings overcame to some extent language difficulties. Two people who thought in different units, owing perhaps to different training, could understand each other better if they could put their ideas on paper in the form of drawings. Dealings with a foreigner were simplified if drawings are understood, as these were the same in all languages.

Changing Conditions

At present great changes were taking place in industry; the natural raw materials, which had up to the present been either used direct or worked up into refined articles, were becoming exhausted, too expensive, or not of such good reliable quality as was required for modern needs. For instance, natural dyestuffs had almost been completely replaced by artificial dyes; wool, silk, and cotton were being slowly replaced by artificial fibres; raw coal was being converted into coke, gas, and even into oil, in which field extensive research was at present taking place in Germany; even foods were becoming more refined, sterilised milk, canned food, cooked cereals, etc., all involving processes covered by the work of the chemical engineer.

As these processes developed the demand for an engineer specially trained on the lines set forth by the Institution of Chemical Engineers would increase. In many branches of industry it was found that men trained as specialists spoke different languages, and misunderstandings arose from their not thoroughly understanding each other and appreciating each other's point of view. This resulted in uneconomical production and slowing-down of development. The training of the chemical engineer was designed to enable him to be the link between various specialists so that plant could be constructed and operated by the most economical methods.

THE MARKETING OF POTASH from the newly-developed Blodelsheim concession in Alsace is expected to be distinct from that covered by Société Commerciale des Potasses d'Alsace. The directorate of the Compagnie des Potasses d'Alsace, which is working the Blodelsheim concession, includes on its board a representative of the Kuhlmann concern, the largest French chemical company, and it is reported that the Kuhlmann Company is promoting the new company to strengthen its position in the French fertiliser industry.

Chemicals in Liverpool

A Note on Local Industry

IN connection with the Liverpool Civic Week, celebrations of which began on Saturday, October 16, and end to-day (October 23) an account of local industry was published in the *Liverpool Post and Mercury*. This account contains the following items of chemical interest:

"Merseyside is the home of the heavy chemical industry also, and fine chemicals for the pharmacies are manufactured here in bulk. The first alkali works in the country were established in Vauxhall Road in 1823 by James Muspratt, and the administrative centre of the huge industry which has grown therefrom remains in the city. The United Alkali Co. of to-day, with a gifted Muspratt still at the head, employs millions sterling of capital, has many thousands of workmen, and from its great works at Widnes and Runcorn produces incalculable quantities of products which are as the life-blood to unnumbered industries. Other notable local chemical enterprises include the Castner Kellner Alkali Co., Ltd., whose works are at Weston Point, adjoining those of the Salt Union; Thomas Vickers and Sons, Ltd., with phosphate works at Widnes; and Brotherton and Co., Ltd., who have near Bromborough Port the only plant available in this country for the manufacture of hydrosulphates by modern processes. At Ellesmere Port is a large branch works of the British Dyestuffs Corporation, Ltd.

"On the fine chemical side, such firms as Evans, Sons, Lescher and Webb, Ltd.; Ayrton, Saunders and Co., Ltd.; Sumner and Co.; John Thompson; and Clayton and Jowett, are known wherever medicinal chemicals are used.

Salt, Sugar, and Soap

"Salt is another vital Merseyside industry, being introduced herein 1690 by John Blackburne, when rock salt was discovered in Cheshire. Four generations of the Blackburne family carried on the industry, and in 1818 the Salt Union, Ltd., was formed, the head offices being moved from London to Liverpool eighty years later. The original works were on a portion of the "Salt Hous Moor, over the Pool," but the fourth member of the controlling family moved to the Garston shore. The Salt Union works are at Winsford and Runcorn, and have an enormous output.

"As for sugar, Liverpool refineries produce approximately 400,000 tons per annum, this being a quarter of the total annual consumption in the British Isles, and over 40 per cent. of all the sugar refined in this country is handled here. A great volume of business is done in the importation and exportation of sugar in various stages of refinement. There is no need to emphasise the fact that Tate and Lyle, and Fairrie are great powers in the trade throughout the world. Of the four great refineries in the port some are nearly a century old. All are equipped on the most modern scientific lines, and produce the finest white sugar procurable. In consequence of their enormous purchases of the raw material, Liverpool is an important factor in the fixing of prices, and many noted brokers operate here.

"And then, of course, if the world were searched, only one Port Sunlight could be found. That is a cosmos in itself, and its fame is universal. Every good Merseysider knows that the genius of a Warrington grocer developed this amazing community from a tiny soap works employing a staff of ten, and that Sunlight products now engage thousands of persons in all parts of the globe."

Artificial Silk Developments

SOME interesting developments are occurring in the artificial silk industry, especially as some of the new concerns floated during the 1925 boom have commenced production. The Kirklees Artificial Silk Co., Ltd., is producing viscose silk at Tottington (Lancashire), and at Gloucester. The Aintree works of British Euka were formally opened on Friday. The capital of the company is £1,000,000 and the plant installed has a capacity of 20,000 lb. of viscose per day. The Rayon Manufacturing Co. and the Western Viscose Co. will be producing viscose also in the near future. Both nitrocellulose and viscose are being produced at Stowmarket by the Bulmer Rayon Co., who are aiming at an output of 8,000 lb. per week of the former, and 60,000 lb. per week of the latter. It is probable that Courtaulds, Ltd., will shortly commence the production of acetate silk in addition to viscose silk.

European Trade Restriction

Bankers' and Business Men's Plea

THE following statement has been issued by a number of prominent industrialists and bankers of Great Britain, Austria, Belgium, Czechoslovakia, Denmark, France, Germany, Holland, Hungary, Italy, Norway, Poland, Roumania, Sweden, Switzerland, and the United States :—

We desire, as business men, to draw attention to certain grave and disquieting conditions which, in our judgment, are retarding the return to prosperity. It is difficult to view without dismay the extent to which tariff barriers, special licences and prohibitions since the war have been allowed to interfere with international trade and to prevent it from flowing in its natural channels. At no period in recent history has freedom from such restrictions been more needed to enable traders to adapt themselves to new and difficult conditions. And at no period have impediments to trading been more perilously multiplied without a true appreciation of the economic consequences involved.

The break-up of great political units in Europe dealt a heavy blow to international trade. Across large areas, in which the inhabitants had been allowed to exchange their products freely, a number of new frontiers were erected and jealously guarded by customs barriers. Old markets disappeared. Racial animosities were permitted to divide communities whose interests were inseparably connected. The situation is not unlike that which would be created if a confederation of States were to dissolve the ties which bind them, and to proceed to penalise and hamper, instead of encouraging, each other's trade. Few will doubt that under such conditions the prosperity of such a country would rapidly decline.

Imposition of Tariffs, etc.

To mark and defend these new frontiers in Europe, licences, tariffs, and prohibitions were imposed, with results which experience shows already to have been unfortunate for all concerned. One state lost its supplies of cheap food, another its supplies of cheap manufactures. Industries suffered for want of coal, factories for want of raw materials. Behind the customs barriers new local industries were started, with no real economic foundation, which could only be kept alive in the face of competition by raising the barriers higher still. Railway rates, dictated by political considerations, have made transit and freights difficult and costly. Prices have risen, artificial dearness has been created. Production as a whole has been diminished. Credit has contracted and currencies have depreciated. Too many states, in pursuit of false ideals of national interest, have imperilled their own welfare and lost sight of the common interests of the world, by basing their commercial relations on the economic folly which treats all trading as a form of war.

There can be no recovery in Europe till politicians in all territories, old and new, realise that trade is not war but a process of exchange, that in time of peace our neighbours are our customers, and that their prosperity is a condition of our own well-being. If we check their dealings, their power to pay their debts diminishes, and their power to purchase our goods is reduced. Restricted imports involve restricted exports, and no nation can afford to lose its export trade. Dependent as we all are upon imports and exports, and upon the processes of international exchange, we cannot view without grave concern a policy which means the impoverishment of Europe.

Need for Breaking Economic Barriers

Happily there are signs that opinion in all countries is awaking at last to the dangers ahead. The League of Nations and the International Chamber of Commerce have been labouring to reduce to a minimum all formalities, prohibitions and restrictions, to remove inequalities of treatment in other matters than tariffs, to facilitate the transport of passengers and goods. In some countries powerful voices are pleading for the suspension of tariffs altogether. Others have suggested the conclusion for long periods of commercial agreements embodying in every case the most-favoured-nation clause. Some states have recognised in recent treaties the necessity of freeing trade from the restrictions which depress it. And experience is slowly teaching others that the breaking-down of the economic barriers between them may prove the surest remedy for the stagnation which exists. On the valuable political results which might flow from such a policy, from the substitution of good-will for ill-will, of co-operation for exclusiveness, we will not dwell. But we wish to place on record our conviction that the establishment of economic freedom is the best hope of restoring the commerce and the credit of the world.

Among the signatories to the statement are the following :—

GREAT BRITAIN : Sir Arthur Balfour (Arthur Balfour and Co., Ltd., Sheffield), Sir Hugh Bell, William Howarth (president, Textile Institute), Kenneth Lee (Tootal, Broadhurst, Lee and Co., Ltd.), Sir Adam Nimmo (chairman, Scottish Coal Owners' Association), Right Hon. Montague Collet Norman (governor, Bank of England), Sir Josiah Stamp, Lord Weir, and Colonel F. V. Willey (Francis Willey and Co., Ltd., Bradford).—AUSTRIA : Dr. Otto Böhler (steel manufacturer), Dr. Siegmund Brosche (chemical manufacturer), Dr. A. Krupp (metal manufacturer), and Dr. R. Schoeller (steel manufacturer).—BELGIUM : J. Carlier (vice-president, Council of Industry and Commerce).—CZECHOSLOVAKIA : Dr. H. Karlik (president, Central Association of Czechoslovak Sugar Industry).—FRANCE : R. P. Duchemin (president, Union des Industries Chimiques ; president, Confédération Générale de la Production Française), P. Richemond (president, Union des Industries Métallurgiques et Minières).—GERMANY : Dr. Bosch (director of the I.G. Farbenindustrie A.-G.), K. F. von Siemens (chairman, Siemens Bros.), Generaldirektor Vögler (Steel Trust, Dortmund).—HOLLAND : C. E. ter Meulen (Hope and Co., bankers).—ITALY : Riccardo Gualino (president, "Snia Viscosa").

The remaining signatories are mainly bankers.

Chemists' Salaries

To the Editor of THE CHEMICAL AGE.

SIR,—With reference to your recent correspondence regarding salaries of chemists, may I quote the following case, my own ? After two years' training with a consulting chemist I obtained a post as assistant chemist with a firm of nut crushers and oil refiners at Silvertown. After three years in their service I was receiving the salary of £110 per annum. I was then asked to sign an agreement of a most binding character. Upon my refusal I was dismissed. Surely this firm must hold the record for low salaries ?—Yours, etc.,

A. G. KNIGHT.

52, Barry Road, East Dulwich, October 14.

"Tin Rush" in Cornwall

THE world shortage of tin and the consequent high price now ruling has been responsible for what is described as a "great tin rush" in Cornwall, which has visions of a new era of prosperity in the mining industry. Nothing like the scenes which are now being witnessed in that county have taken place for many years. Only four years ago practically all the Cornish tin mines, which are the oldest in the world, were standing idle, but to-day they are working at full capacity, derelict plants having been restarted, and tin is being sought for on moor and sea coast in somewhat extraordinary fashion. In the districts round Redruth and Camborne little groups of adventurers, locally known as "tin streamers," may be seen panning the streams in an endeavour to capture the minute grains of the precious metal which have escaped from the stamps and crushes at the mines. Throughout the entire area prospectors are making trial borings for tin or tapping the crusts in the hope of striking an alluvial deposit. Most curious of all, perhaps, is the enterprise which is being carried out at Portheras Beach, near Pendeen. Here a company of beachcombers, as they may be described, are busily engaged. When tin was a commodity which hardly repaid the cost of getting, rough-and-ready methods were employed in the crushing and washing of the ore, and a good deal of tin was lost into the streams and finally carried out to sea. It deposited itself among the sands of the bays, and at several points on the coast the receding tide leaves black streaks of tin particles on ridge after ridge of the beaches. At Portheras these ridges are now being carefully raked, the black deposit filled into buckets, which are carried by an aerial ropeway to the head of the cliffs, where the contents are sifted and milled by special plants before being dispatched to the smelters. There are no unemployed tin miners in Cornwall at present.

American Chemical Endowment

Three Projects of 1926

THE need for community brains is taking shape in great research organisations, states Mr. D. H. Killeffer, secretary of the New York Section of the American Chemical Society, in a summary of chemical progress during 1926. Even "the man in the street," he says, is feeling the urge of co-operative effort in science to conquer disease, to advance industry, and to help us to attain a higher level of living. The launching of three research projects sponsored by Mr. Secretary Hoover, Mr. John D. Rockefeller, Junr., and Senator Ransdell, of Louisiana, he calls one of the most striking developments of recent times, pointing out that "these undertakings are designed particularly for the public good as distinct from individual or corporate benefit." Efforts initiated during the early days of the world war have reached the point of building and the nation may be encouraged to hope for their ultimate fruition.

"More than two years ago a committee of the American Petroleum Institute at the instigation of Mr. B. T. Brooks drew up a report on the latent possibilities of petroleum as a source of chemical raw materials with the idea of interesting capital in endowing research to bring them out. As is often the way with well-meant efforts of this character, the report was given more or less perfunctory consideration and pigeonholed. Nothing, apparently, was going to be done about it, and at the Baltimore meeting of the American Chemical Society, Mr. Charles H. Herty set off an unsuspected bomb under those who should have provided action by calling vigorous attention to the dearth of research by the petroleum industry beyond that having a direct bearing on its production problems.

$500,000 for Petroleum Chemistry

"So completely had the report been forgotten that petroleum chemists rose in arms against what they considered to be an entirely unjustified attack upon them, and as a result of the disturbance thus created attention was forcefully called to the oversight, and action initiated. The first gift for this purpose was made by John D. Rockefeller, Junr., of a fund of $250,000 to be available, under the trusteeship of Messrs. W. C. Teagle, J. C. Donnell, and R. L. Welch, in five equal annual instalments, and this was followed by an equal sum given under similar conditions by the Universal Oil Products Co.

"These two gifts make $100,000 per year for five years available for research in the chemistry of petroleum. In general, it is expected that the work to be done under grants from these funds will be in the field of pure science, and will presumably be carried out through subsidies to research workers in existing institutions rather than by the building of a new one. Any results are to be available to the public. Final plans of administration are being prepared by the American Petroleum Institute with the co-operation of various committees of the National Research Council. No announcement of grants from this fund has been made, but it is understood that this will follow the completion of arrangements now under way.

General and Medical Research

"The plan of the National Academy of Sciences is broader and includes the endowment of research in pure science in every field for the general good of future generations. Realising that advances in applied science, which contribute so largely to the wealth and comfort of modern civilisation, can only be expected on the basis of the now thankless labour of pure science, the Academy has set out to accumulate a fund of $20,000,000 to support fundamental research and to reduce the great gap which now separates the rewards of the academician and the industrialist. The fund, under a special board of trustees of which Secretary Hoover is chairman, has reached a total of more than $3,000,000 contingent upon raising the whole fund, and although this is being increased from time to time, the activity of its promoters is being carried on so quietly that few know it is going on at all. Naturally, plans for its expenditure await developments, but it is understood that it will be used to initiate and further research in existing institutions.

"The third great endowment of research is in a nebulous and uncertain state. Indeed, it is as yet no more than a gigantic conception, which may take years to materialise, if it ever does. Following the ideas promulgated years ago by a committee of the American Chemical Society, as set forth in the little volume 'The Future Independence and Progress of American Medicine in the Age of Chemistry,' Senator Ransdell, of Louisiana, has introduced a Bill into the Senate calling for the creation of a National Institute of Health on a huge scale, for the development of medicine and of the treatment of disease."

Problems of Industry

Sir Max Muspratt's Address

SIR MAX MUSPRATT, president of the Federation of British Industries and chairman of the United Alkali Co., Ltd., speaking at a luncheon given by the American Chamber of Commerce in London on Thursday, October 14, dealt with some of the problems with which industry is faced at the present time.

A great number of those problems, he said, were social and economic problems over which industrialists had no control, but the whole burden of them fell on their shoulders. Any dislocation in the normal cycle of trade came back either on the working man as the spender, or on the manufacturer because he had less outlet for his production. Labour unrest was the result of dislocation for which in nine cases out of ten neither employer nor worker was responsible. He suggested that it was to the interest of everyone who wanted those difficult and disturbing problems settled, or at any rate alleviated, that they should try to realise that one of the most important matters at the present time was stability—stability of price, to enable the standard of living not to be unduly altered, and stability of production, to enable production to proceed to the highest point possible. Production and the spending power of wages were the main things. Rapid fluctuations in either the cost of living or in the rate of production were a great danger. Fluctuation in the cost of living particularly was felt in every home in the country, and a feeling of unrest was produced which led to bad work, sulky workmen and everything which tended to reduce production.

Economic Laws

Another problem was the misunderstanding of sound economic laws, which was far too prevalent at the present time. If employers and employed were really to come together they must get away from those misunderstandings. In addition to misunderstanding, they could not close their eyes to the fact that there was deliberate mischief-making. They had to try to distinguish between a not unnatural misunderstanding in the mind of the working men and women of this country and deliberate mischief-making.

His suggestion for dealing with the problem was to call for greater leadership from those engaged in industry, commerce, and finance. He was afraid that the upper middle class (to use the best phrase he could think of) had allowed the natural leadership in this country, which belonged to them by right of intellect, right of knowledge, and right of achievement, to slip away. They must try to revive it. It was absolutely essential that every man of the commercial, financial, or industrial classes who wished well for his country should take a deeper interest in the day-to-day work of the public services of the country and be prepared to sacrifice some of his time and knowledge to that end.

Society of Technical Engineers

THE London Central Branch of the Society of Technical Engineers held the opening meeting of the present session on Wednesday, when Mr. C. T. Inman, A.M.I.E.E., chairman of the branch, delivered an address on the present work and policy of the society. Mr. Inman said that outside the ranks of the electricity supply industry, which had its protective organisation in the Electrical Power Engineers' Association, the Society of Technical Engineers remained and was likely to remain the only body of its kind catering for the needs of technical engineers in all branches of the engineering profession employed in industry. It was founded at the end of the war with the primary object of improving the status and position of engineers, and its success or otherwise could only be judged by the measure of its service to the engineering profession as a whole.

Modern Calico Printing Problems

Dyers and Colourists' Meeting

THE Manchester section of the Society of Dyers and Colourists held their first meeting for the Session 1926–27 on Friday, October 15, in the lecture room of the Manchester Literary and Philosophical Society. The Chairman of the Section, Mr. J. R. Hannay, F.I.C., presided, and read a Paper entitled: "Some problems of Calico Printing Technique."

Mr. Hannay said that the development within recent years of a large range of dyestuffs, much superior in fastness to washing and light to any of the dyestuffs of 20 years ago, had raised technical problems for the printer which so far had only been partially solved. The printing of fine patterns, which formerly involved the use of back-greys which were ultimately destined for bleaching and finishing, must be done either on bump greys, or on wash-blankets without back-greys when modern fast dyes were used. Bump-greys were exceedingly expensive and had a very short life. The ordinary type of wash blanket was not suitable for the production of fine patterns, and was rapidly destroyed by alkaline print colours. Rubber-faced blankets did not give a good printing surface, and were liable to blister and peel. What was known as a rubber-proofed blanket was probably the best form of printing surface which had emerged so far, but it had many deficiencies, and, when patterns were very fine, could not produce work to compare with that done on back-greys.

The ageing of vat colours was still a matter of considerable difficulty. There seemed to be little doubt that the various members of the vat dye series possessed highly individualistic properties about which we were as yet comparatively ignorant. The production of discharge styles on vat-dyed grounds had now been accomplished, and the extension of the range of colours available in the Indigosol form was making the handling of this style rapidly simpler. The search for a reagent capable of stripping the vat dyes without tendering the cloth should be vigorously pursued. One might reasonably hope that such a reagent might be found, although at first sight the quest seemed rather an impossible one.

The habit of issuing certain types of goods to the public with an unlimited guarantee as to fastness was one against which printers should protest. At the very least, it should be made plain that the unlimited guarantee was a merchant's and not a printer's device, and that meantime for general ranges of goods it outstripped both the necessities and the possibilities of the case.

Artificial Silk in Canada

FOR a good many years Canada has supplied much of the sulphite pulp used for making artificial silk in many countries. In 1922 the Natural Resources Intelligence Branch of the Canadian Department of the Interior published a report drawing attention to the unusually favourable conditions for the development of artificial silk manufacturing in its entirety, within the Dominion. The following year Courtaulds, Ltd., the largest rayon manufacturers in the United Kingdom, sent engineers to Canada to investigate these representations, with the result that a plant was established in Cornwall, Ontario, in 1924, at a cost of $2,500,000. This would appear to be but the preliminary of many others. Canadian Celanese, Ltd., capitalised at $7,000,000, is now constructing a large plant at Drummondville, Quebec; and the Howard Smith Paper Mills have formed a subsidiary company called the Canadian Cellulose Co., which will also be operated at Cornwall. The British Columbia Pulp and Paper Co., formerly the Whalen Pulp and Paper Co., operating pulp mills in British Columbia, has been carrying on chemical research for some time in the utilisation of hemlock for the production of cellulose, and certain results and conclusions have been reached which, it is stated, may determine the company to proceed with installation of a new plant for the manufacture of this sort of pulp. Many other companies variously located from the Maritime provinces to the Pacific Coast are also taking steps or considering means to enter this field, which is so profitable and so large, and which Canadian resources, both of wood reserves and natural power supplies, are particularly adapted to support.

Indian Chemical Notes

(FROM OUR INDIAN CORRESPONDENT.)

PROFESSOR C. V. RAMAN, F.R.S., and his associates in research in Calcutta are reported to have made an interesting discovery which promises to throw light on magnetism in its relation to chemistry. It has been demonstrated that molecules of all common liquids, water or paraffin for instance, when placed in a strong magnetic field, orientate and tend to place themselves so that certain favoured directions are parallel to the field. Investigation shows every molecule in a liquid state to possess different magnetic properties in different directions, and these differences can be measured and connected with the chemical structure of the molecule.

Research in Manures

From many experiments carried out in South India, the Director of Agriculture, Madras, has come to the definite conclusion that organic manure is most essential to the crops, and that artificial manures can by no means be a substitute for them. But the difficulty is to get enough of this organic manure from cattle. The Rothamsted farm had revealed that good farmyard manure can be made from waste materials of various kinds without the intervention of cattle, *i.e.*, by inoculating the material with certain bacteria. The study of this process was taken up at the Coimbatore farm, and a method has now been worked out which is successful. Some excellent manure has been made and the Department is now in a position to try out the method on a large scale; there is every prospect of making large quantities of farmyard manure from materials like paddy, straw, groundnut husk, coconut husk, etc.

Soap Manufacture in Calcutta

The Calcutta Soap Works, a concern of more than seven years' standing, has been showing good results every year. An addition has now been made to the glycerine plant by purchase of refining machinery of a recently-invented type. This plant, when complete, will yield pure glycerine. The manufacture of cardboard boxes, which was taken up as an experimental move last year, has proved a success. The factory is certainly the best equipped in India, and the quality of its products is of a high standard. But its difficulty, as its recent report states, is that it has to struggle with slender means against vast resources aided by favourable exchange.

Coal in Burma

According to Mr. F. W. Walker, of the Geological Survey of India, writing in a publication of the Department, several large deposits of coal exist in Burma, but the majority are of lignite, which has high moisture and ash content, but small content of fixed carbon. Samples from three of these lignite fields, namely the Namma field, the Lashio field, and the Pauk field, were examined and analysed, and it was found that they did not cake, that the moisture content was about 24 per cent., volatile matter about 36 per cent., and fixed carbon about 37 per cent.

The Calcutta Laboratory

It is gratifying to find that the Industrial Research Laboratory started by the Government in Calcutta is preparing for work. Equipment consisting of a porcelain ball mill, a cone mill, a positive pressure blower, a centrifugal machine and an injector furnace has already been provided. Further equipment consisting of an experimental hydraulic press for oil seed expression, a universal filter press, an air pump for vacuum distillation, a draught muffle furnace, a combustion furnace, a mechanically operated mortar and pestle and an experimental steam generator is under supply. The industrial laboratory expects to begin definite research work into certain problems connected with the glass industry, the soap and oil industry, and the paint and varnish industry.

Technology of Mica

W. M. MYERS, associate mineral technologist, Bureau of Mines, recently conducted an extensive field study in the mica districts of South Dakota, Montana, Idaho, Washington, California, and New Mexico. Considerable information was accumulated on the technology of mica production and manufacture, which will be assembled in a report on this subject to be issued at a later date by the Bureau.

International Pulp and Chemical Co.

Position of the Koholyt A.G.

AT the extraordinary general meeting of the Inveresk Paper Co., Ltd., held on Friday, October 15, in Edinburgh, Mr. William Harrison, chairman, reviewed the position of the company and its subsidiaries. Among the latter is the International Pulp and Chemical Co., Ltd., in regard to which Mr. Harrison stated that in January, 1926, they negotiated the purchase for the sum of £781,430 of 21,900, out of a total of 22,000 shares of 800 gold marks each, in the Koholyt A.G., owning five large freehold factories in Germany engaged in the manufacture of high-grade chemical pulp, paper, chlorine, and other products used largely in the manufacture of paper. In February, 1926, they formed the International Pulp and Chemical Co., Ltd., with a capital of one million pounds, consisting of 600,000 8 per cent. cumulative participating preference shares and 400,000 ordinary shares, the latter of which they and their associates subscribed for in cash at par.

The International Company was, therefore, through its holding of the share capital of Koholyt A.G., above referred to, entitled to practically the entire property of that German company. They regarded that purchase as one of their most valuable investments. The Koholyt Company, of which they did not assume active management until March 1 last, had been run from an administrative point of view by their predecessors on lines which, in his opinion, left room for substantial improvement. In addition, the company's net earning capacity was adversely affected by trade loans at exorbitant rates of interest, which were then prevalent in Germany by reason of the financial crisis through which that country had just passed. On taking over control they immediately took the necessary steps to crystallise that company's floating trade indebtedness into two hands at about 6 per cent. interest, and thus effected a large saving in interest, and they were concentrating on other important internal economies of a most drastic nature, which would be reflected in their net future earnings. The fruits of their labours, however, would only be apparent in the current year of the Koholyt Company —that is to say, from July 1, 1926—and as their products were well sold over the financial year ending June 30, 1927, they looked forward with every confidence to reaping a handsome return on their investment, which would eventually find its way into the treasury of the Inveresk Company, and thus materially increase their profits for 1927 and in the future.

This year he had paid numerous visits to Germany in connection with the Koholyt works there, and had had many opportunities of observing at first hand the economic situation in that country. With reference to conditions in Germany, he had on more than one occasion recently told them of the gigantic strides which that great nation had made subsequent to the stabilisation of its currency. He thought it his duty to inform them (the shareholders) and the preference shareholders in their associated company, the International Pulp and Chemical Co., Ltd., that on a conservative estimate which his colleagues and he had personally made they valued the net assets of the Koholyt Company at not less than £3,000,000.

The Proposed Berthelot Memorial

AMERICA will participate in the movement to create in Paris a memorial to Marcelin Berthelot, according to a proposal made at a luncheon given in honour of five members of the French delegation to the recent chemical conferences at Philadelphia and Washington. The guests of honour were Paul Sabatier, Gabriel Bertrand, Pierre Bellanger, Justin Dupont, and Jean Voisin. Twenty-five men prominent in scientific and business circles were present. The proposed memorial, according to M. Dupont, would take the form of a building on the Boulevard des Invalides, in the shadow of Napoleon's tomb, the site having been donated by the French Government. "In this house," he said, "it is our purpose to gather all published material bearing on the progress of synthetic organic chemistry in every part of the world. In such a centre the cause of research will be better promoted than is possible to-day, for everything which the memorial building shall provide will be open to all the world."

Wellcome Medical Museum Reopened

THE Wellcome Historical Medical Museum, Wigmore Street, London, which was founded by Mr. Henry S. Wellcome in 1913 and which is designed to present collections illustrating the history of medicine, surgery, chemistry, pharmacy, and the allied sciences, was formally reopened on Thursday, October 14, after being closed since November, 1925, for reorganisation and enlargement. The valuable collection of medical exhibits has been reclassified, and the technical and administrative staff has been increased by men qualified to carry on the development of the museum on strictly scientific lines as planned by the founder, who desires it to be of educative value to research workers and students. It includes a hall of primitive medicine, illustrating the methods by which primitive races cured their bodily ills, an anatomy room, a hall of statuary, depicting the classical period in medicine and surgery, a portrait gallery, and many historical exhibits. A very interesting exhibit on the ground floor is an English alchemical manufacturing laboratory of the seventeenth century. This reconstructed laboratory is one such as Paracelsus might have used. Mysterious, gloomy and dark, with strange animals and fish depending from the roof casting fantastic and eerie shadows on the old stone walls, it offers a glimpse of the surroundings of the worker in science some centuries ago. Most of the equipment in this laboratory was in use in England for the production of medicaments until quite recently.

Company Director Sent to Prison

BEFORE the Recorder, Sir Ernest Wild, K.C., on October 15, Alfred Percy Brown, 42, a merchant, surrendered to his bail and pleaded guilty to charges of forging and uttering share certificates for 250 and 200 shares of the Lion Talc and Grinding Co., Ltd., with intent to defraud. He was sentenced to fifteen months' hard labour. Passing sentence, the Judge said, "Ten years ago you were convicted and punished for fraud. That is such a long time ago that I take no notice of it except in your favour, because after that time you tried to retrieve your position and you served your country well and efficiently. When you came out of the army you endeavoured to lead an honourable life. Then you found yourself in the position of a director of a company known as the Lion Talc and Grinding Co., Ltd., and at the time when you committed the offence you knew perfectly well that that company had no capital to carry out its expectations, and you induced two gentlemen to invest money in that company. Instead of putting that money into the company you put the money, namely, £450, into your own pocket, and forged the share certificates in order to make those gentlemen believe that their money was invested in the company."

Gas Light and Coke Co.'s Extension

THE Duchess of York, who was attended by Lady Helen Graham, on Tuesday opened the new showrooms and offices of the Gas Light and Coke Company in Church Street, Kensington, and afterwards made a tour of the building, which is very spacious and illustrates many new uses of gas. The Duchess was received by Mr. D. Milne Watson, the governor of the company, Miss Milne Watson, and the Mayor and Mayoress of Kensington. Mr. Watson said the Duchess was following the example set by the King and Queen last July, when they visited the company's Beckton works, and the visit of the Duke of York to the same works in November, 1922. The Mayor of Kensington, in welcoming the Duchess to the royal borough, pointed out that the new building had no chimneys visible in its roof—an important matter in a city which suffered so much from smoke and dirt.

Paint, Colour and Varnish Research Association

THE Secretary of the Department of Scientific and Industrial Research begs to announce that a licence under Section 20 of the Companies (Consolidation) Act, 1908, has been issued by the Board of Trade to the Research Association of British Paint, Colour and Varnish Manufacturers, which has been approved by the Department as complying with the conditions laid down in the Government scheme for the encouragement of industrial research. The secretary of this association is Mr. J. B. Graham, 8, St. Martin's Place, Trafalgar Square, London, W.C.2.

From Week to Week

MR. G. W. ELLIS has had conferred on him the degree of Doctor of Science (Chemistry) of the University of London.

MR. A. LYALL, M.A., M.D., M.R.C.P., has been appointed Lecturer in Clinical Chemistry and Clinical Chemist in the Aberdeen Royal Infirmary.

THE USE OF POISON GAS IN WAR is favoured by the American Legion, who oppose the ratification of the Geneva Protocol prohibiting its use.

MR. MAX WOOSNAM, who is in charge of the welfare department of the works of Brunner, Mond and Co., Ltd., at Northwich, has undergone a successful operation for appendicitis.

THE DYERS' COMPANY held a general court on Wednesday, October 13. Mr. Septimus Marshall was elected Prime Warden, and Lieut.-Colonel Edward Thomas Lea, Renter Warden.

PROFESSOR F. E. FRANCIS, of the University of Bristol, announced, in the course of a recent public lecture at the university on "The Atmosphere," that a factory for the production of oxygen from liquid air was to be opened in Bristol.

J. SHERMAN AND CO., LTD., of Downham Mills, Tottenham, London, N.17, Manchester, Hoboken, Hamburg, etc., advise us that they have appointed Mr. Norman Sladden as a director of their company vice Mr. B. G. H. Chase, resigned.

DR. J. D. M. ROSS, of Edinburgh, has been appointed to the Lectureship in Physical Chemistry in University College, Dundee, vacant by the resignation of Dr. O. R. Howell, appointed to a post in Manchester Municipal Technical College.

THE SOCIETY OF CHEMICAL INDUSTRY has accepted the invitation of the Edinburgh and East of Scotland Section to hold the annual general meetings of the society in Edinburgh in 1927. The date of the meeting has been provisionally fixed for July 4 to 8, 1927.

THE MAGDALENE TIN MINE, Ponsonooth, Cornwall, has suspended operations, owing to failure to obtain the necessary supplies of anthracite. The mine, which employed a large number of men, has been working continuously for many years producing not only tin but magnetite.

MR. A. T. KING, CHIEF CHEMIST to the British Research Association for the Woollen and Worsted Industries, is delivering a special course of lectures at Galashiels Technical College. At the inaugural lecture, on Thursday, October 14, he dealt with "Scientific and Practical Aspects of Wool Scouring."

SYNTHETIC PETROL is said to have been prepared by M. Audibert, director of the French National Society for Research, whose laboratories are established near Senlis. The method employed is to pass a mixture of hydrogen and oxide of carbon, at a pressure of 200 atmospheres, over a catalyst.

MR. GEORGE E. ALEXANDER, chairman of the British Association of Glass Bottle Manufacturers and a director of the Aire and Calder Glass Bottle Works, has been elected chairman of the United Glass Bottle Manufacturers, Ltd., in succession to the late Sir Ernest Fitzjohn Oldham, and Sir Max Bonn has been elected deputy-chairman.

SIR ALFRED AND LADY MOND were among those who accepted invitations to the reception given by the Prime Minister and Mrs. Baldwin, on behalf of His Majesty's Government, at Lancaster House, St. James's, London, on Tuesday evening, to meet the Dominion Representatives and those from India attending the Imperial Conference.

RECENT WILLS INCLUDE: Major John Francis Hall-Edwards, L.R.C.P., of Gough Road, Edgbaston, Birmingham, a pioneer in X-ray work, £5,111, with net personalty £4,964.—Mr. Arthur George Charleton, of West Kensington, past president of the Institute of Mining and Metallurgy, £3,513 (net personalty £3,417).—Mr. Reginald Harrison, of Sunderland, managing partner of W. B. Harrison, wholesale chemists, £15,645 (net personalty £6,397).

THE FARADAY SOCIETY will hold a general meeting on Wednesday, October 27, at 8 p.m., in the rooms of the Chemical Society, Burlington House, London, W.1, when the following will read papers:—A. C. Vivian, "Beryllium"; F. I. G. Rawlins, "The Chemical Constants of the Halogen Hydrides"; J. Colvin, "The Decomposition of Nitrosotriacetonamine in Presence of Hydroxyl Ion, Part I., The Region of Small Concentration of Alkali"; Freda M. Hunter, "Latent Heat of Dilution of Sugar Cane Solutions"; J. J. Hedges, "The Adsorption of Water by Colloidal Fibres"; A. N. Campbell, "The Anodic Behaviour of Ferro-Managanese"; T. Carlton Sutton, "Abnormal Absorption of Gases by Steel"; R. H. Humphry and R. S. Jane, "The Observation of Cataphoresis in Colourless Sols., 1, Rubber in Benzene"; J. S. Dunn, "A Simple Kinetic Theory of Viscosity"; and A. C. Chatterji and N. H. Dhar, "Condition of Silver Chromate in Gelatin from Electric Conductivity and Diffusive Experiments."

DR. J. T. DUNN, PUBLIC ANALYST, gave an address entitled "The Work of a Public Analyst" to the Newcastle Chemical Industry Club last week.

A FIRE BROKE OUT on Thursday, October 14, at the tar slag works of Weymac, Ltd., Old Park, near Oakengates, the damage done being estimated at about £1,000.

DR. C. WEIZMANN, formerly a lecturer in chemistry at the Manchester College of Technology, and now leader of the Zionist movement, is leaving England for a visit to America.

THE BRITISH ENKA ARTIFICIAL SILK factory at Aintree, near Liverpool, was officially opened on Friday by the Lord Mayor of Liverpool, as part of the Liverpool Civic Week celebrations.

FRANCO-GERMAN DYESTUFF NEGOTIATIONS will probably be resumed in the near future, especially with a view to helping to lay the foundations of a general commercial treaty between the two countries.

THE I. G. FARBENINDUSTRIE'S nitrate of lime plants at Höchst, Germany, have been expanded to permit an increase in the production to 10,000 metric tons monthly. New and modern laboratories have been built.

THE TRIAL OF WILLIAM MILLER KNEALE, of Old Hall Street, Liverpool, for alleged libel concerning Mr. Francis D'Arcy Cooper, managing director of Lever Brothers, Ltd., has been postponed till the November session of the Central Criminal Court.

THE PRINCE OF WALES, during the course of his visit to Hull last week, visited, among other places, the works of Reckitt and Sons, the paint, colour and varnish works of Sissons, Brothers and Co., and the Eagle Mill of the British Oil and Cake Mills, Ltd.

THE I. G.'S RECENTLY REPORTED CONTRACT with Russia for three years' delivery of dyes, chemicals, etc., is now confirmed. In return for the contract the I.G. will provide technical and commercial assistance to Russia in the development of the latter's chemical industry.

DR. J. S. OWENS (Superintendent to the Advisory Committee on Atmospheric Pollution) will lecture on some "Aspects of Atmospheric Pollution," at the University of Birmingham on November 3, under the auspices of the British Association of Chemists (Birmingham Association). Sir John Robertson will preside.

PROFESSOR S. P. L. SÖRENSEN, of Copenhagen, will deliver the Hugo Müller Memorial Lecture, entitled "The Composition and the Characterisation of Proteins," before the Chemical Society on Thursday, October 28, at 8 p.m., in the Lecture Hall of the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1.

APPLICATIONS ARE INVITED for the following appointments: Lecturer and Demonstrator in Inorganic and Physical Chemistry in the University of Sydney, New South Wales, £450–£40–£700. The Agent-General for New South Wales, Australia House, Strand, London, W.C.2. October 30.—Lecturer in Organic Chemistry in the University of Birmingham. £400. The Secretary. October 30.

MR. A. T. GREEN, A.Inst.P., is the President of the Stoke-on-Trent Association of Engineers for the present session. He has been for the past six years Research Physicist to the British Refractories Research Association, working under Dr. Mellor, the Director of Research for that association. He has done much lecturing in North Staffordshire in metallurgy and chemistry and kindred subjects.

Obituary

MR. AUGUSTINE BOND, managing director of the Cambrian Wagon Co., Ltd., on October 9.

MR. E. G. RIPPEL, president of the Chemical and Vacuum Machinery Co., aged 57, at Cleveland, U.S.A.

MR. G. K. ELLIOTT, chief chemist and metallurgist to the Lunkenheimer Co., aged 45, at Cincinnati. He had carried out research on the electric furnace.

DR. A. J. ROSSI, aged 87, consulting chemist to the Titanium Pigment Co. and Titanium Alloy Manufacturing Co. Dr. Rossi was the Perkin Medallist in 1918.

PROFESSOR ALEXANDER GUTBIER. According to accounts which have appeared in the German press, Professor Gutbier, whose death was reported in these columns last week, committed suicide.

MR. DAVID STEWART, works manager, who was fatally injured at Law's Chemical Works, Crawford Street, Glasgow. He had been examining an engine when he was struck on the head by a revolving wheel. He died on his way to the hospital.

MR. E. O. ROTHMAN, manager of Eonit, Ltd., chemical manufacturers, of Tratt Street, Camden Town, London, on Tuesday, October 12. He was found lying on a metal case-hardening furnace, the four-inch main gas feed being turned on at full pressure. An inquest is being held.

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REACTIONS.—The replaceability of the halogen atom in 2-chloro- and in 2-bromo-1 : 6 : 8-trinitronaphthalene. E. J. van der Kam. *Rec. Trav. Chim. Pays-Bas.*, July, 1926, pp. 564-581.

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Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

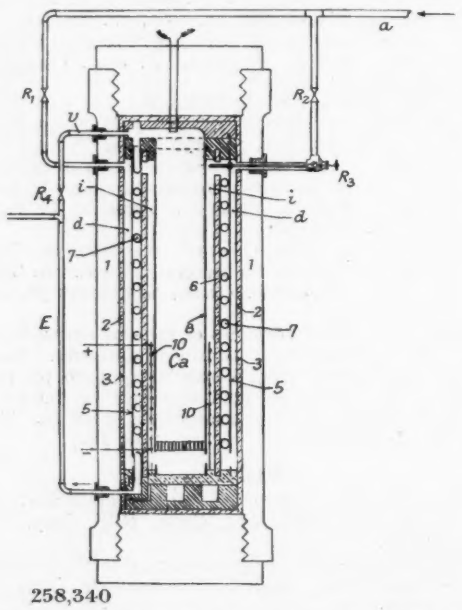
Abstracts of Complete Specifications

258,313. Finely Divided Metal Oxides and Silica, Manufacture and Production of. J. Y. Johnson. From Badische Anilin und Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, May 15, 1925.

Iron carbonyl vapour is mixed with air, with or without inflammable gases or vapours, and ignited, or the iron carbonyl may be mixed with a combustible liquid such as alcohol, and the mixture sprayed in air and ignited. A catalyst such as platinised asbestos may be present. The product is a highly dispersed iron oxide suitable for use as a pigment, or as a polish, or as a catalyst, or for the preparation of very finely divided metallic iron. In an example, iron pentacarbonyl is atomised by compressed air in excess and passed through a tube heated to 500° C. The iron oxide is carried along with the gas and is then filtered out. The product is very fine, and 1 gram may occupy 4–40 cubic centimetres. The size of the particles may be less than 150 μμ. The iron carbonyl may be mixed with other metal carbonyls and volatile metal or silicon halogenide may be used, in which case combustible matter must be added. Thus ferric chloride, chromyl chloride, aluminium chloride, silicon tetrachloride, or titanium chloride may be brought into a flame in a finely divided condition.

258,340. Synthesis of Ammonia, Apparatus for. G. Cicali, 109-2, Via Castiglione, Bologna, Italy. Application date, June 17, 1925.

A high pressure steel cylinder 1 is provided with a heat insulating lining 2 kept in position by a metal sheet 3. A sheet metal cylinder 5 is open at the bottom, a cylinder 6 consisting of heat insulating material between metal sheets is open at the top, and an inner cylinder 8 consisting of sheet metal is open at the bottom. The nitrogen-hydrogen mixture is supplied through a tube *a* and valves R_1, R_2 to the outer annular space *d* and part of the mixture passes through a valve R_3 direct to the inner space *i*. The incoming cold gas

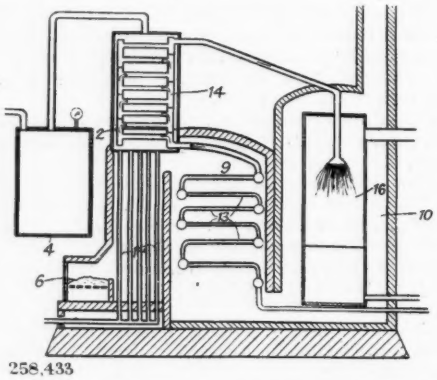


258,340

maintains the outer cylinder 1 at a low temperature, and then passes into the lower end of the space surrounding a coil 7, where it is heated by the gases passing through the coil in counter-current. The mixture then passes downwards around the inner cylinder 8 and over the heated resistance 10 which raises the gas to the combining temperature. The mixture then passes into the catalyst Ca, where ammonia is formed, and the hot gases pass out through the coil 7 to the pipe E and thence through a water-cooled condenser and ammonia-cooled condenser to a receiver for the liquid ammonia. The temperature of the catalyser can be controlled by the provision of a pipe *v* and valve R_4 so that only a portion of the hot gas passes through the coil 7. Regulation of the temperature is also effected by the admission of part of the incoming cold gas through the valve R_3 directly into the inner part of the catalyser.

258,433. Distillation or Cracking of Tars, Petroleum Oils, and Similar Materials. C. R. Downs, 50, East 41st Street, New York. Application date, October 7, 1925.

The object is to control the temperature of distillation of tars, oils, etc., so as to obtain either a minimum or a maximum decomposition, and this is effected by employing



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sulphur vapour as the medium of heat transmission. Sulphur is boiled in tubes 1 heated by a fire 6, the sulphur level being at 2. The tar is heated in a coil 14, and the sulphur vapour condenses around it. The requisite pressure to produce condensation of sulphur vapour at the desired temperature is maintained by a neutral gas from a reservoir 4. The combustion gases from the fire 6 pass through a chamber 9 over the tar preheating coils 13, and then through a chamber 10 containing a condenser 16 where the vaporised products from the still 14 are condensed. By this method excessive heating of the still 14 and carbonisation of the tar are prevented.

258,436. Distilling Oil, Process of. L. E. Hirt, Fort Worth, Tex., U.S.A. Application date, October 12, 1925.

The oil is caused to flow in a thin film through a series of heated tubes containing helical or other baffles. An inert gaseous material such as steam is preheated and passed through the tubes in counter current to remove the vaporised constituents.

258,462. Camphor from Isoborneol, Process for the Production of. H. Gammay, 207, Reinsburgstrasse, Stuttgart, Germany. Application date, January 7, 1926.

In the production of camphor from isoborneol by means of chromic acid, the chromic acid has been greatly diluted and the whole of it has been brought into reaction at once, or the isoborneol has been dissolved in acetone to ensure contact with the chromic acid or salts if gradually added. In the first case large vessels are necessary, and in the second case recovery of the solvent is difficult. In this invention, the isoborneol is subdivided in water to which a small quantity of solvent is added to initiate the reaction. A mixture of sodium bichromate and dilute sulphuric acid is very gradually added to a suspension of isoborneol in water containing a little benzol. The addition of chromic acid is stopped when the temperature has risen to the highest point permissible. The process may alternatively be carried out by adding sulphuric acid to the water containing the isoborneol, and then adding the necessary bichromate solution.

258,475. Isoborneol from a Mixture of Camphene and Associated Oils, Process for the Production of. H. Gammay, 207, Reinsburgstrasse, Stuttgart, Germany. Application date, February 4, 1926.

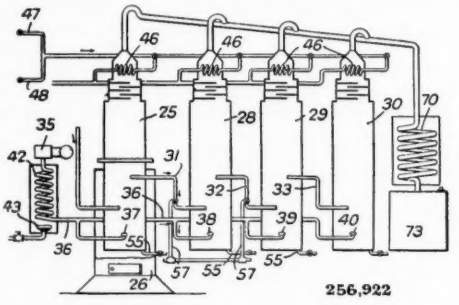
When producing isoborneol or camphor from pinene, the mixture of pinene hydrochloride and the associated oils is dechlorinated and the camphene is separated by fractional distillation. It has been found that in fractional distillation a large proportion of camphene remains dissolved and is not recovered. The yield of isoborneol or camphor can be considerably increased if the camphene and its associated oils are esterified and then saponified. Isoborneol is obtained together with an oil which can be centrifugally separated. The oil is free from camphene, and contains only a small proportion of isoborneol. In an example, a mixture of pinene hydrochloride and accompanying hydrochloride oils is dechlorinated to obtain a mixture of camphene and dechlorinated oils. The mixture is esterified with formic acid, and the isoborneol formate is saponified with soda lye yielding a mixture of isoborneol and associated oils, which is cooled and centrifuged.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention :—236,538 (Abbott Laboratories), relating to production of diacetoxy-mercuri-4-nitro-orthocresol and its compounds, see Vol. XIII, p. 255 ; 240,492 (Farbenfabriken vorm. F. Bayer and Co.), relating to manufacture of wool dyestuffs of the anthraquinone series, see Vol. XIII, p. 581 ; 248,724 (Orkla Grube Aktiebolag), relating to process of depositing copper from solutions, see Vol. XIV, p. 47 (Metallurgical Section) ; 248,738 (Verein für Chemische und Metallurgische Produktion), relating to manufacture of pure hydrochloric acid, see Vol. XIV, p. 526 ; 255,474 (M. Buchner), relating to production of hydroxides and carbonates, see Vol. XV, p. 308.

International Specifications not yet Accepted

256,922. Oxidising Oils, etc. W. B. D. Penniman, 341, St. Paul's Place, Baltimore, U.S.A. International Convention date, August 13, 1925.

The process is applicable to petroleum and its distillates, shale oils and tars, waxes, sludges, petroleum residues, asphaltic oils, asphalt, naphthas, cracked oils and residues, wood tar oils, wood tar, peat and lignite distillates, coal tar oils, coal tar, oils containing powdered coal, coke, peat, sulphur, etc. The products include acetaldehyde, propionaldehyde, formic, acetic, propionic, butyric, acrylic and phthalic acids, alcohols, acetone, solvents, gums, motor fuel, etc. The raw material is



256,922

treated with air, which may be enriched with oxygen, and the temperature range may be 300° to 1,000° F. Aluminium chloride, or oxide of manganese, lead, iron, chromium, or vanadium may be added as catalyst, and also neutralising agents, such as quicklime, limestone, or alkali carbonate. The products are condensed with or without pressure, and residual vapour may be extracted from the air by silica gel or absorbent carbon.

A series of vertical stills 25, 28, 29, 30 may be used, with a condenser 70. The still 25 is heated by a furnace 26, and the oil passes through the stills in succession. Air is supplied by a pump 35 through a heating coil 42. Each still may have a diphlegmator and heat interchanger, and a coil 46 connected to steam mains 47, 48 to control the temperature of the vapours. Partly treated oil can be withdrawn by pipes 57, and residues by pipes 55. The pressure employed is 300 to 400 lb. per square inch, and the temperature rises by 50° F. in each succeeding still. An example is given of the treatment of a mid-continental gas oil, containing 1 per cent. of sulphur, at a temperature of 725° to 750° F., and pressure of 300 lb. per square inch, particulars being given of the recovery and purification of a number of products.

256,933. Oil Extraction. H. Wittek, 4, Kantstrasse, Beuthen, Upper Silesia, Germany. International Convention date, August 12, 1925.

Tars free from paraffin, tar oils, and pitches are agitated with paraffin oil, petroleum distillate, or other oil mainly consisting of paraffin hydrocarbons, the tar, etc., being in solution in ethyl alcohol, wood spirit, acetone, or a mixture of alcohol with benzol or carbon tetrachloride. Neutral oils are obtained. The layers formed on standing are separated, washed with water, and distilled to separate the solvents, oils, and phenols.

256,964–5. Hydrogenating Carbonaceous Materials. I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, August 14, 1925.

256,964. To prevent coking in the hydrogenation of coal, tars, mineral oils, resins, asphalts, etc., the raw material is mixed with lignite or peat. A catalyst such as roasted pyrites, or a product containing molybdenum may be used. The heated parts of the apparatus may be made of inert material such as iron coated with chromium or alloys rich in chromium such as chromium-nickel-iron, substantially free from carbon. In an example, brown coal producer tar with 10 per cent. of lignite or peat is treated in a reaction vessel coated with manganese bronze, with hydrogen at a pressure of 200 atmospheres, and pressure of 450° C. Lighter liquid hydrocarbons are obtained, and the heavier products may be re-treated to obtain benzines, or converted into lubricating oils.

256,965. Coal tars, mineral oils, asphaltic materials, and other carbonaceous substances are treated in a gaseous or finely divided liquid or solid state at elevated temperatures and pressures with hydrogen or gases containing it. Catalysts may be added to the gas or the carbonaceous material, or these may be passed over the catalyst. The hydrogen may be used again after adding water vapour. Any suitable mechanical disintegration or atomisation by means of the hydrogen may be adopted to finely divide the material to be treated. In an example, a mixture of mineral oil two parts, and lignite containing 40 per cent. of water, one part, is converted into a fine mist and treated with a mixture of nitrogen and hydrogen at 450° C. and 200 atmospheres pressure. The hydrogenation takes place without coking.

256,972. Fertilisers. I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, August 14, 1925.

A fertiliser is made by mixing in the solid state or by spraying solutions together, ammonium nitrate and di-ammonium phosphate, with or without potassium chloride or sulphate, or calcium salts.

256,989. Dyes. I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Assignees of Farbwerke vorm. Meister, Lucius, und Brüning, Hoechst-on-Main, Germany. International Convention date, July 21, 1924. Addition to 237,294.

Specification 237,294 (see The Chemical Age, Vol. XIII, p. 333) describes the condensation of the dianhydride of naphthalene-1 : 4 : 5 : 8-tetracarboxylic acid with an *o*-diamine. In this invention the free acid is substituted for the dianhydride, or a salt for the *o*-diamine. Thus, the acid may be condensed with *o*-phenylene-diamine or 4-methyl-*o*-phenylene-diamine, and the dianhydride with *o*-phenylene-diamine hydrochloride, or 4-methoxy-*o*-phenylene-diamine hydrochloride, with or without nitrobenzene. Red to brown shades are given on cotton.

Latest Notifications.

259,528. Manufacture of artificial silk. British Enka Artificial Silk Co., Ltd. October 12, 1925.

259,538. Process of manufacturing photographic silver halide emulsions. I. G. Farbenindustrie Akt.-Ges. October 7, 1925.

259,598. Process of treating liquids containing tasty and aromatic substances for the purpose of improving their taste and aroma. I.G. Farbenindustrie Akt.-Ges. October 12, 1925.

259,608. Manufacture of derivatives of benzanthrone which contain sulphur. I.G. Farbenindustrie Akt.-Ges. October 10, 1925.

Specifications Accepted with Date of Application

236,230. Hydrogenating tar oils, Process of. W. Demann. June 30, 1924.
239,949. Heavy metal carbides and similar difficultly melting compounds. Manufacture of. Gewerkschaft Wallram Abteilung Metallwerke. September 8, 1924.
244,775. Treatment of gas liquors for removing phenolic impurities therefrom. L. W. Heffner and W. Tiddy. December 16, 1924.
245,100. Isolating oil, starch, albuminous substances, and cellulose from oleaginous materials. L. F. David and G. Felizat. December 29, 1924.
250,555. Esters of isoborneols and borneols, Process for the manufacture of. Chemische Fabrik auf Actien (vorm. E. Schering). April 11, 1925.
258,948. Extracting a volatile metal from its ore, Process of. E. M. Johnson. July 1, 1925.
258,960. Dyestuffs, Process of preparing. British Alizarine Co., Ltd., and C. M. Barnard. July 4, 1925.
258,973. Complex alkali or alkaline earth antimony compounds, Manufacture of. W. Carpmael. (*Farbenfabriken vorm. F. Bayer and Co.*) July 17, 1925.
258,974. Concentrated and fuming sulphuric acid, Catalytic process for producing. S. G. S. Dicker. (*K. Kudoh.*) July 17, 1925.
259,030. Resinous bodies, Process of producing. Chemische Fabriken Dr. K. Albert Ges, A.-Amann, E. Fonrobert. October 5, 1925.
259,091. Copper silicon alloys. W. Denecke. February 2, 1926.
259,102. "Blanc fixe" from barium sulphide, Process for the production of. A. Jahl. November 5, 1925.
259,108. Silver alloys. Soc. Française de Monnayage. February 2, 1926.
259,118. Electrolytic separation of metallic chromium, Process for. R. Appel. November 26, 1925.
259,153. Quinine salts of oxyphenyl-arsinic acids, Manufacture of. F. Hoffman-La Roche and Co., Akt.-Ges. November 6, 1925.
259,166. Purification of phosphatides, Process for. H. Bollmann. October 6, 1925.

Applications for Patents

Barbet, E. A. Production of glycerine. 25,539. October 13.
Beaufour, H. Process of extraction of albumino-caseins of vegetable origin, etc. 25,420. October 12. (France, October 23.)
Bensa, G. U. F. Manufacture of dinitro products of perylene, etc. 25,315. October 11. (Austria, October 28, 1925.)
Binz, A., and Rath, C. Production of substitution products of pyridine. 25,633. October 14. (Austria, October 17, 1925.)
British Dyestuffs Corporation, Ltd., Hailwood, A. J., and Shepherdson, A. Manufacture of sugar, etc. 25,760. October 15.
California Cyanide Co., Inc. Method of making calcium cyanide, etc. 25,659. October 14. (United States, November 23, 1925.)
Carpmael, W., and Chemische Fabriken auf actien vorm. E. Schering. Manufacture of guanidines. 25,881. October 16.
Consortium für Elektrochemische Industrie Ges. Manufacture of acetals. 25,400. October 12. (Germany, January 25.)
Courtaulds, Ltd., and Topham, C. F. Manufacture of artificial threads, etc. 25,285. October 11.
Courtaulds, Ltd., Turney, E. G., and Wood, F. T. Manufacture of artificial silk. 25,286. October 11.
Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. Preparation of new pyridine derivatives. 25,300. October 11. (Austria, October 17, 1925.)
Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. Production of β-pyridylhydrazine, etc. 25,301. October 11. (Austria, October 17, 1925.)
Deutsche Gold-und Silver-Scheideanstalt vorm. Roessler. Production of isonaphthyridine, etc. 25,529. October 13. (Austria, October 17, 1925.)
Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. Production of pyridine derivatives. 25,662. October 14. (Austria, October 17, 1925.)
Donald, W. Production of oil and gas from coal. 25,382. October 12.
Hanovia Chemical and Manufacturing Co. Polarisation of ultra-violet rays. 25,849. October 16. (United States, May 1.)
I.G. Farbenindustrie Akt.-Ges. Production of carbon disulphide. 25,265. October 11. (Germany, November 3, 1925.)
I.G. Farbenindustrie Akt.-Ges. Manufacture of cleansing, etc., agents. 25,516. October 13. (Germany, October 21, 1925.)
I.G. Farbenindustrie Akt.-Ges. Manufacture of azo dyestuffs. 25,519. October 13. (Germany, October 14, 1925.)
I.G. Farbenindustrie Akt.-Ges. Linings for acid-resisting vessels. 25,738. October 15. (Germany, October 27, 1925.)
I.G. Farbenindustrie Akt.-Ges. Fungicide. 25,739. October 15. (Germany, August 5.)
I.G. Farbenindustrie Akt.-Ges. Manufacture of condensation products of urea, etc. 25,842. October 16. (Germany, October 21, 1925.)
Nanji, D. R. Manufacture of inks, etc. 25,456. October 13.
Ransford, A. J., and Cassella and Co. Ges. Manufacture of aromatic compounds. 25,406. October 12. (August 7, 1925.)
Scottish Dyes, Ltd., Thomas, J., and Thomson, R. F. Dyestuffs, etc. 25,538. October 13.
Synthetic Ammonia and Nitrates, Ltd., Slade, R. E., and Harrison, C. F. R. Low-temperature distillation of carbonaceous material. 25,480. October 13.

Patent Rights in Irish Free State

An important international issue is involved in a case which opened, in the Supreme Court, Dublin, on Monday, before the Chief Justice, Mr. Justice FitzGibbon, and Mr. Justice Murnaghan, states the Dublin correspondent of *The Times*. The plaintiffs in the case of British Thomson-Houston Co., Ltd., *v.* Litton and Co., Ltd., appealed from a judgment of Mr. Justice Meredith, dismissing, with costs, an application for an interlocutory injunction made on behalf of the plaintiffs pending the trial of the action for a perpetual injunction restraining the defendants from manufacturing, selling, dealing in, or supplying articles made in infringement of the plaintiffs' letters patent. The plaintiffs are manufacturers of electrical commodities in London, and the defendants are a firm of electrical engineers carrying on business in Dublin. In opening the appeal, counsel explained that the letters patent were dated 1912 and 1913, respectively, for a period of 14 years, which subsequently was extended. It was not denied, he understood, that there had been an infringement of the plaintiffs' patent rights if they existed, and it was agreed that the sole and only question in the appeal was whether the effect of the establishment of the Free State had been, as ruled by Mr. Justice Meredith, to abrogate all the existing patent rights at the coming into operation of the constitution of Saorstat Eireann. The hearing of the appeal was adjourned.

Petroleum Technologists' Research Fund

The sum of £400 is allocated in each calendar year by the Institution of Petroleum Technologists to the advancement of research in petroleum technology and its basic sciences, and the Council are prepared to receive applications for assistance from this fund. Applications from persons proposing to engage in research in any university or other teaching institution must be supported by the professor under whom the applicant will be working. Applications from associate members, students, or associates of the Institution of Petroleum Technologists and non-members, not proposing to engage in research in any university or other teaching institution, must be supported by a member of the Institution or other responsible person. Applications from full members of the Institution do not require a supporter. Applications for grants from this fund will be considered in June and December of each year amd must be received by the secretary not later than June 1 or December 1 respectively. Application forms and the conditions under which the awards are made may be obtained from the secretary of the Institution at Aldine House, Bedford Street, Strand, London, W.C.2.

New Zinc Extraction Process

Interesting trials, on a commercial scale, of a new method for extracting zinc from its ores have recently been carried out. The process is known as the "Coley" process and has been worked out by Mr. H. Edwin Coley and developed during the past four years to its present stage by him and the staff of the firm of H. Edwin Coley, Ltd., of 12A, Charterhouse Square, London, E.C.1. The plant has been erected and worked on the premises of Stewarts and Lloyds, at Coombs Wood, Halesowen, Birmingham. It is claimed that the trials have shown that the process is sound, and that it is possible to obtain practically a complete extraction of the zinc from low grade or other ores at a temperature of 300° C. less than present practice, and at a cost far below the present cost of zinc production. The process is continuous. The English rights have been acquired by the N.C. Metal Co., Ltd., of 49, Cannon Street, London, E.C.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £37 per ton, Powder, £39 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.

ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, packages extra, returnable.

BLEACHING POWDER.—Spot, £9 10s. d/d; Contract, £8 10s. d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystal, £23 per ton. Powder, £24 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

CALCIUM CHLORIDE (SOLID).—£5 12s. 6d. to £5 17s. 6d. per ton d/d carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3⅜d. per lb., ex wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER, 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65%.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—4⅞d. to 5¾d. per lb. Crude 60's, 1s. 4d. to 1s. 8d.

ACID CRESYLIC 99/100.—2s. 6d. per gall. 97/99.—2s. to 2s. 1d. per gall. Pale, 95%, 1s. 10d. to 2s. 3d. per gall. Dark, 1s. 9d. to 2s. 3d. per gall. Steady.

ANTHRACENE.—A quality, 2½d. to 3d. per unit. 40%, 3d. per unit.

ANTHRACENE OIL, STRAINED.—8d. to 8½d. per gall. Unstrained, 7½d. to 8d. per gall.; both according to gravity.

BENZOL.—Crude 65's, 1s. 1d. to 1s. 5d. per gall., ex works in tank wagons. Standard Motor, 1s. 8½d. to 2s. 3d. per gall., ex works in tank wagons. Pure, 2s. 3d. to 3s. per gall., ex works in tank wagons.

TOLUOL.—90%, 2s. to 3s. 3d. per gall. Pure, 2s. 3d. to 3s. 6d. per gall.

XYLOL.—2s. 3d. to 3s. per gall. Pure, 4s. per gall.

CREOSOTE.—Cresylic, 20/24%, 10½d. per gall. Standard specification, 6⅝d. to 7⅛d. middle oil, 7½d. to 7⅝d. per gall. Heavy, 8½d. to 9d. per gall. Firm.

NAPHTHA.—Crude, 10d. to 1s. 1d. per gall. according to quality. Solvent 90/160, 2s. to 2s. 3d. per gall. Solvent 90/190, 1s. 3d. to 1s. 4d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £4 10s. to £8 per ton. Whizzed or hot pressed, £5 10s. to £8 10s.

NAPHTHALENE.—Crystals, £11 to £12 10s. per ton. Flaked, £11 to £13, according to districts.

PITCH.—Medium soft, 160s. to 170s. per ton, according to district.

PYRIDINE.—90/140, 16s. to 17s. per gall. Heavy, 7s. to 10s. per gall. Quiet.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. 6d. per lb. 100%.

ACID BENZOIC.—1s. 9d. per lb.

ACID GAMMA.—8s. per lb.

ACID H.—3s. 3d. per lb. 100% basis d/d.

ACID NAPHTHIONIC.—2s. 2d. per lb. 100% basis d/d.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb. 100% basis d/d.

ACID SULPHANILIC.—9d. per lb. 100% basis d/d.

ANILINE OIL.—9½d. per lb. naked at works.

ANILINE SALTS.—9½d. per lb. naked at works.

BENZALDEHYDE.—2s. 1d. per lb.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

BENZOIC ACID.—1s. 8½d. per lb.

o-CRESOL 29/31° C.—3½d. to 3⅝d. per lb.

m-CRESOL 98/100%.—2s. 1d. to 2s. 3d. per lb.

p-CRESOL 32/34° C.—2s. 1d. to 2s. 3d. per lb.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—2s. per lb. d/d. Drums extra.

DINITROBENZENE.—9d. per lb. naked at works.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLAMINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d.

B-NAPHTHOL.—11d. to 1s. per lb. d/d.

a-NAPHTHYLAMINE.—1s. 3d. per lb. d/d.

B-NAPHTHYLAMINE.—3s. per lb. d/d.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. per lb. d/d.

p-NITRANILINE.—1s. 9d. per lb. d/d.

NITROBENZENE.—7d. per lb. naked at works.

NITRONAPHTHALENE.—10d. per lb. d/d.

R. SALT.—2s. 4d. per lb. 100% basis d/d.

SODIUM NAPHTHIONATE.—1s. 9d. per lb. 100% basis d/d.

o-TOLUIDINE.—9d. per lb. naked at works.

p-TOLUIDINE.—2s. 2d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 11d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8. Grey, £17 10s. per ton. Liquor, 9d. per gall. 32° Tw.

CHARCOAL.—£7 to £9 per ton, according to grade and locality.

IRON LIQUOR.—1s. 6d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.

RED LIQUOR.—9½d. to 1s. per gall.

WOOD CREOSOTE.—2s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 6d. per gall. 60% O.P. Solvent, 3s. 6d. per gall, 40% O.P.

WOOD TAR.—£3 to £5 per ton, according to grade.

BROWN SUGAR OF LEAD.—£39 to £40 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 5½d. per lb., according to quality, Crimson, 1s. 3d. to 1s. 7½d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—2s. per lb.

BARYTES.—£3 10s. to £6 15s. per ton, according to quality.

CADMIUM SULPHIDE.—2s. 9d. per lb.

CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£46 to £55 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5¾d. to 6¾d. per lb.

LAMP BLACK.—£35 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE, 30%.—£22 10s. per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton f.o.r. London.

SULPHUR.—£9 to £11 per ton, according to quality.

SULPHUR CHLORIDE.—4d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb. carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—5s. 3d. per lb.

ZINC SULPHIDE.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, 80% B.P.—£39 per ton ex wharf London in glass containers.

ACID, ACETYL SALICYLIC.—2s. 4d. to 2s. 5d. per lb.

ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., according to quantity.

ACID, BORIC B.P.—Crystal, £43 per ton; Powder, £47 per ton. Carriage paid any station in Great Britain, in ton lots.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 3¼d. to 1s. 4¼d. per lb. Market rather weak.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.

ACID, SALICYLIC, B.P.—1s. 3½d. to 1s. 5d. per lb. Technical.—10½d. to 11d. per lb.

ACID, TANNIC B.P.—2s. 9d. to 2s. 11d. per lb.

ACID, TARTARIC.—1s. 0¼d. per lb., less 5%. Market firm.

AMIDOL.—9s. 6d. per lb., d/d.

ACETANILIDE.—1s. 7d. to 1s. 8d. per lb. for quantities.

AMIDOPYRIN.—11s. 6d. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity.

AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.

ASPIRIN.—2s. 4d. to 2s. 5d. per lb.

ATROPINE SULPHATE.—11s. per oz. for English make.

BARBITONE.—8s. 9d. per lb.

BENZONAPHTHOL.—3s. 3d. per lb. spot.

BISMUTH CARBONATE.—12s. 3d. to 14s. 3d. per lb.

BISMUTH CITRATE.—9s. 3d. to 11s. 3d. per lb.

BISMUTH SALICYLATE.—10s. to 12s. per lb.

BISMUTH SUBNITRATE.—10s. 6d. to 12s. 6d. per lb., according to quantity

BORAX B.P.—Crystal, £27; Powder, £28 per ton. Carriage paid any station in Great Britain, in ton lots.

BROMIDES.—Potassium, 1s. 8½d. to 1s. 9d. per lb.; sodium, 1s. 11d. to 2s. per lb.; ammonium, 2s. 2d. to 2s. 3d. per lb., all spot. Quiet.

CALCIUM LACTATE.—1s. 3½d. to 1s. 4½d.

CHLORAL HYDRATE.—3s. 3d. to 3s. 6d. per lb., duty paid.

CHLOROFORM.—2s. 3d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

FORMALDEHYDE.—£39 per ton, in barrels ex wharf.

GUAIACOL CARBONATE.—7s. to 7s. 6d. per lb.

HEXAMINE.—2s. 4d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 8d. per gallon f.o.r. makers' works, naked.

HYDROQUINONE.—4s. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 3s. 6d. per lb., for 28-lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.

IRON AMMONIUM CITRATE B.P.—2s. to 2s. 3d. per lb. Green, 2s. 4d. to 2s. 9d. per lb. U.S.P., 2s. 1d. to 2s. 4d. per lb.

IRON PERCHLORIDE.—22s. per cwt., 112 lb. lots.

MAGNESIUM CARBONATE.—Light Commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light Commercial, £67 10s. per ton, less 2½%; Heavy Commercial, £22 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.

MENTHOL.—A.B.R. recrystallised B.P., 19s. 6d. net per lb.; Synthetic, 10s. 6d. to 11s. 6d. per lb., according to quantity; Liquid (95%), 12s. per lb. Detached Cryst., 15s. 9d. per lb.

MERCURIALS.—Red oxide, 5s. 9d. to 6s. 4d. per lb.; Corrosive sublimate, 4s. to 4s. 8d. per lb.; white precipitate, 4s. 10d. to 5s. 2d. per lb.; Calomel, 5s. to 5s. 2d. per lb.; Yellow Oxide, 5s. 7d. to 5s. 8d. per lb. Mercury rather firmer.

METHYL SALICYLATE.—1s. 6d. per lb.

METHYL SULPHONAL.—15s. 6d. per lb.

METOL.—11s. per lb. British make.

PARAFORMALDEHYDE.—1s. 9d. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN.—3s. 9d. to 4s. per lb.

PHENAZONE.—5s. 9d. to 6s. per lb.

PHENOLPHTHALEIN.—4s. per lb.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—81s. per cwt., less 2½% for ton lots.

POTASSIUM CITRATE.—1s. 11d. to 2s. 2d. per lb.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb., in cwt. lots.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.

POTASSIUM METABISULPHITE.—6d. per lb., 1-cwt. kegs included, f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 6½d. per lb., spot.

QUININE SULPHATE.—2s. per oz., 1s. 8d. to 1s. 9d. in 100 oz. tins.

RESORCIN.—4s. 3d. per lb., spot.

SACCHARIN.—55s. per lb.

SALOL.—3s. per lb.

SODIUM BENZOATE, B.P.—1s. 10d. to 2s. 2d. per lb.

SODIUM CITRATE, B.P.C., 1911.—1s. 8d. to 1s. 11d. per lb. B.P.C., 1923—2s. to 2s. 1d. per lb. U.S.P., 1s. 11d. to 2s. 2d. per lb., according to quantity.

SODIUM FERROCYANIDE.—4d. per lb. carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 5s. per ton, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—75s. to 80s. per cwt., according to quantity.

SODIUM SALICYLATE.—Powder, 1s. 9d. to 1s. 10d. per lb. Crystal, 1s. 10d. to 1s. 11d. per lb.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.

SODIUM SULPHITE, ANHYDROUS, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.

SULPHONAL.—10s. 6d. per lb.

TARTAR EMETIC, B.P.—Crystal or Powder, 1s. 10d. to 1s. 11d. per lb.

THYMOL.—13s. 9d. per lb., according to quantity.

Perfumery Chemicals

ACETOPHENONE.—10s. per lb.

AUBEPINE (EX ANETHOL).—12s. per lb.

AMYL ACETATE.—2s. per lb.

AMYL BUTYRATE.—5s. 6d. per lb.

AMYL SALICYLATE.—3s. 3d. per lb.

ANETHOL (M.P. 21/22° C.).—6s. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. 3d. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. 3d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 9d. per lb.

BENZYL BENZOATE.—2s. 6d. per lb.

CINNAMIC ALDEHYDE NATURAL.—18s. per lb.

COUMARIN.—11s. 6d. per lb.

CITRONELLOL.—15s. per lb.

CITRAL.—9s. 6d. per lb.

ETHYL CINNAMATE.—10s. per lb.

ETHYL PHTHALATE.—3s. per lb.

EUGENOL.—10s. per lb.

GERANIOL (PALMAROSA).—19s. per lb.

GERANIOL.—6s. 3d. to 10s. 6d. per lb.

HELIOTROPINE.—4s. 10d. per lb.

ISO EUGENOL.—13s. 6d. per lb.

LINALOL.—Ex Shui Oil, 12s. Ex Bois de Rose, 17s. per lb.

LINALYL ACETATE.—Ex Shui Oil, 15s. Ex Bois de Rose, 18s. 6d. per lb.

METHYL ANTHRANILATE.—9s. 3d. per lb.

METHYL BENZOATE.—5s. per lb.

MUSK KETONE.—36s. per lb.

MUSK XYLOL.—8s. 6d. per lb.

NEROLIN.—3s. 9d. per lb.

PHENYL ETHYL ACETATE.—12s. per lb.

PHENYL ETHYL ALCOHOL.—10s. per lb.

RHODINOL.—30s. per lb.

SAFROL.—1s. 6d. per lb.

TERPINEOL.—1s. 6d. per lb.

VANILLIN.—20s. per lb.

Essential Oils

ALMOND OIL.—11s. 6d. per lb.

ANISE OIL.—3s. 8d. per lb.

BERGAMOT OIL.—35s. per lb.

BOURBON GERANIUM OIL.—11s. 6d. per lb.

CAMPHOR OIL.—67s. 6d. per cwt.

CANANGA OIL, JAVA.—20s. per lb.

CINNAMON OIL, LEAF.—5½d. per oz.

CASSIA OIL, 80/85%.—9s. 3d. per lb.

CITRONELLA OIL.—Java, 85/90%, 2s. 6d. Ceylon, pure, 2s. 1d. per lb.

CLOVE OIL.—6s. 9d. per lb.

EUCALYPTUS OIL, 70/75%.—2s. per lb.

LAVENDER OIL.—French 38/40%, Esters, 18s. 6d. per lb.

LEMON OIL.—10s. 6d. per lb.

LEMONGRASS OIL.—4s. 6d. per lb.

ORANGE OIL, SWEET.—10s. 3d. per lb.

OTTO OF ROSE OIL.—Bulgarian, 70s. per oz. Anatolian, 30s. per oz.

PALMA ROSA OIL.—9s. 9d. per lb.

PEPPERMINT OIL.—Wayne County, 35s. per lb. Japanese, 11s. 9d. per lb.

PETITGRAIN OIL.—9s. per lb.

SANDALWOOD OIL.—Mysore, 25s. per lb. Australian, 17s. 3d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, October 21, 1926.

THE demand for chemicals has been fairly satisfactory during the past week having regard to existing conditions. There is undoubtedly more confidence in the future and the outlook is brighter than it has been for some time past. It is reasonable to assume that a settlement of the coal strike would be immediately reflected in the improved business. Export trade is quiet.

General Chemicals

ACETONE.—Price remains nominal and buyers should make specific inquiries before purchasing.

ACID ACETIC is in active demand for export account. Home trade market is steady and unchanged at £37 10s. per ton for technical 80% ; other qualities usual differences.

ACID CITRIC is slow, market being controlled by second-hand offers. Price is 1s. 2¾d. per lb.

ACID FORMIC is in fair demand at 50s. per cwt. for spot delivery.

ACID LACTIC is quietly steady at £43 per ton for 50% by weight.

ACID OXALIC.—The demand is still far below normal. Price 3⅞d. per lb.

ACID TARTARIC is rather easier at 11½d. to 11¾d. per lb.

ALUMINA SULPHATE.—Price remains unchanged at £5 10s. for 17/18%.

AMMONIUM CHLORIDE remains uninteresting. Price is £18 10s. per ton.

BARIUM CHLORIDE is lower in price at £9 7s. 6d. per ton.

COPPER SULPHATE.—Unchanged.

CREAM OF TARTAR is much firmer, consequent upon an improvement in the Italian exchange.

EPSOM SALTS are firm and demand is satisfactory at £5 10s. per ton.

FORMALDEHYDE is in rather short supply for early delivery. Price £40 to £41 per ton.

LEAD ACETATE.—Unchanged at £45 per ton for white, and £43 for brown.

METHYL ACETONE is very firm at £55 to £57 per ton for standard grade.

METHYL ALCOHOL is very quiet and price is £46 per ton.

POTASSIUM CHLORATE.—Unchanged at 3½d. per lb.

POTASSIUM PERMANGANATE is very quiet, B.P. grade being quoted at 7½d. per lb.

POTASSIUM PRUSSIATE is much firmer consequent upon an understanding between the makers. Price is 7d. per lb. and tends upwards.

SODA ACETATE is very firm at £19 15s. per ton to £20 per ton.

SODA BICHROMATE.—A substantial business is passing. British makers' prices unchanged.

SODA NITRITE is rather lower in price at £20 per ton.

SODA PHOSPHATE.—Firm at £14 per ton.

SODA PRUSSIATE is also affected by the understanding between makers and price has advanced to 4¼d. per lb.

SODA SULPHIDE.—Unchanged.

ZINC SULPHATE is a firm market at £14 per ton.

Coal Tar Products

With the continuance of the coal strike, prices generally for coal tar products remain on a high level, and products are somewhat difficult to obtain.

90's BENZOL is firm at 2s. 2d. per gallon on rails, while the motor quality is quoted at 2s. 1½d. per gallon on rails.

PURE BENZOL is worth anything from 4s. to 4s. 6d. per gallon.

CREOSOTE OIL is worth about 8d. per gallon on rails at works in the country. Despite the continuance of the coal strike, this product seems to be a little more plentiful than has been the case for the last week or two.

CRESYLIC ACID is somewhat inactive, and remains unchanged at 2s. 2d. per gallon on rails for the pale quality 97/99%, while the dark quality 95/97% is worth about 2s. 1d. per gallon.

SOLVENT NAPHTHA is unchanged at 1s. 10d. per gallon on rails, and is difficult to obtain.

HEAVY NAPHTHA is quoted at 1s. 6d. to 1s. 7d. per gallon on rails.

NAPHTHALENES are scarce, the 76/78 quality being worth about £8 to £8 10s. per ton, while the 74/76 quality is worth about £7 10s. to £7 15s. per ton at makers' works.

PITCH is scarce and firm at 170s. to 180s. per ton, f.o.b. U.K. port.

Latest Oil Prices

LONDON.—LINSEED OIL very firm and 20s. to 7s. 6d. higher. Spot, £31 15s. ; October, £30 15s. ; November-December, £31 2s. 6d. ; January-April and May-August, £31 10s. RAPE OIL quiet. Crude extracted, £45 ; technical refined, £47, ex wharf. COTTON OIL steady. Refined common edible, £40 ; Egyptian crude, £33 ; deodorised, £42. TURPENTINE steady. American, spot, 63s. ; November-December, 63s. 9d. ; January-April and May-June, 65s. per cwt.

HULL.—LINSEED OIL.—Naked, spot, £31 7s. 6d. ; October to January-April, £31 10s. ; May-August, £31 12s. 6d. COTTON OIL.—Naked Bombay crude, £31 10s. ; Egyptian crude, £32 10s. ; edible refined, £37 ; deodorised, £35 10s. PALM KERNEL OIL.—Crushed naked, 5⅛ per cent., £40 10s. GROUNDNUT OIL.—Crushed/extracted, £43 ; deodorised, £47. SOYA OIL.—Extracted and crushed, £34 10s. ; deodorised, £38. RAPE OIL.—Crude/extracted, £45 ; refined, £47 per ton, net cash terms, ex mill. CASTOR OIL and COD OIL unchanged.

Nitrogen Products

Export.—During the past week inquiries for sulphate of ammonia have been numerous from the Far East, but little business has resulted. British producers are only able to quote for small lots and large orders have been accepted by the Continent. The price remains unchanged at £11 to £11 2s. 6d. per ton, f.o.b. U.K. port. As the production of sulphate of ammonia continues to extend in several foreign countries, the drop in the British production, due to the coal stoppage, is amply covered.

Home.—The feature of the home market has been an increase in the Irish c.i.f. prices by 3s. per ton. This is due to the excessive freight rates resulting from the coal stoppage. Merchants still continue to cover their spring requirements. It is understood that the bookings up to time of going to press are between 20,000 to 30,000 tons in excess of the same period last year. This is almost all due to forward bookings on account of anxiety regarding supplies.

Nitrate of Soda.—The nitrate position is steadily improving ; each week shows greatly increased sales. The biggest demand comes from the United States, where available supplies are being sucked up rapidly. The prices in the United States have advanced by about 10 cents per ton. As stocks in Europe and Egypt are still considerable, the demand there remains sluggish.

Calcium Cyanamide

SOME lively interest continues to be shown in the use of this fertiliser for autumn application to winter corn crops and grassland. The price for calcium cyanamide to farmers for October delivery is £9 6s. per ton for 4 ton lots, carriage paid to any railway station in Great Britain. The corresponding price for November delivery will be £9 8s.

Nitrate Sales

THE arrivals of nitrate amount to about 11,500 tons, and about 18,500 tons are due during the next fortnight. The tone has continued firm throughout the fortnight, under the influence of the rise in freights, and importers have consequently raised prices in continental markets about 5s. per ton. First hand prices are now quoted about £11 3s. to £12 for spot, and £11 8s. 6d., to £12 7s. per 1,000 kilos for February delivery according to market, although resellers have been until recently offering at 5s. to 7s. 6d. per ton lower. Sales by the Producers' Association continue small, and only amount to 46,000 tons during the fortnight, making their total sales for shipment after June 1, 1926, 630,000 tons, as compared with total sales of 1,630,000 tons at this date last year. Deliveries in Europe and Egypt for the first half of October amount to about 25,500 tons, against 37,500 tons last year, making a total of 172,500 tons July 1 to October 15, against 198,000 tons during the same period last year. Stocks at October 15 were about 250,500 tons, and afloat 60,000 tons, against 260,000 and 169,000 tons respectively at October 15, 1925. Shipments for the first fortnight of October were 12,000 tons to Europe and Egypt and 23,000 tons to the United States, as compared with 59,000 tons and 27,000 tons respectively for the corresponding period in 1925, and 122,000 tons and 24,000 tons in 1913.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, October 20, 1926.

THE heavy chemical market still remains quiet, although during this past week there has been a fair amount of export inquiry. Prices both for home and continental products remain unchanged.

Industrial Chemicals

ACID ACETIC.—98/100%, £55 to £67 per ton, according to quality and packing, c.i.f. U.K. port; 80% pure, £39 to £41 per ton; 80% technical, £38 to £39 per ton, c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated or small flakes, £37 per ton; powdered, £49 per ton, packed in bags, carriage paid U.K. stations.

ACID CARBOLIC ICE CRYSTALS.—Still in good demand and quoted price unchanged at 5½d. per lb. delivered or f.o.b. U.K. ports.

ACID CITRIC B.P. CRYSTALS.—Spot material now quoted 1s. 3½d. per lb. less 5% ex store. Offered for early shipment at 1s. 2½d. per lb., less 5% ex wharf.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy ex works.

ACID NITRIC 80°.—Usual steady demand, and price unchanged at £23 5s. per ton ex station, full truck loads.

ACID OXALIC 98/100%.—Quoted 3¾d. per lb. ex store, spot delivery. Offered for prompt shipment from the Continent at about 3⅝d. per lb., ex wharf.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC B.P. CRYSTALS.—Unchanged at 11¾d. per lb., less 5% ex store. Offered for prompt shipment at 11½d. per lb., less 5% ex wharf.

ALUMINA SULPHATE.—17/18%, IRON FREE.—Spot material on offer at about £6 per ton, ex store. Quoted £5 8s. 6d. per ton, c.i.f. U.K. ports, prompt shipment from the Continent.

ALUM, LUMP POTASH.—Unchanged at about £9 per ton, ex store, spot delivery. On offer from the Continent at £7 17s. 6d. per ton, c.i.f. U.K. ports. Crystal powder offered from the Continent at £7 15s. per ton, c.i.f. U.K. ports. Spot material quoted £8 7s. 0d. per ton, ex store.

AMMONIA, ANHYDROUS.—Imported material selling at about 11¼d. to 11½d. per lb., ex wharf, containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered or f.o.b. U.K. ports.

AMMONIA, LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £23 10s. to £25 10s. per ton, ex station. Continental on offer at about £21 10s. per ton, c.i.f. U.K. ports. Fine white crystals of continental manufacture quoted £18 5s. per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED CORNISH.—Spot material unchanged at about £18 per ton, ex store. Quoted £17 10s. per ton, ex wharf. Prompt despatch from mines.

BARIUM CARBONATE 98/100%.—White powdered quality quoted £6 15s. per ton, c.i.f. U.K. ports.

BARIUM CHLORIDE 98/100%.—Quoted £8 17s. 6d. per ton, c.i.f. U.K. ports. Offered for spot delivery at £9 10s. per ton, ex store.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—English material unchanged at £9 10s. per ton, ex station. Contracts 20s. per ton less. Continental now quoted £7 15s. per ton, c.i.f. U.K. port.

BORAX.—Granulated, £22 10s. per ton; crystals, £23 per ton; powdered, £24 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturers' price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, ex station. Continental on offer at £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 10s. per ton, f.o.r. works or at £4 2s. 6d. per ton, f.o.b. U.K. port, for export.

COPPER SULPHATE.—Continental material on offer at about £22 per ton, ex wharf. Moderate inquiry for export, and price of English material about £23 5s. per ton, f.o.b. U.K. ports.

FORMALDEHYDE 40%.—Spot material on offer at £40 per ton, ex store. Quoted £38 per ton, c.i.f. U.K. ports, prompt shipment.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental quoted £2 15s. per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material quoted £37 10s. per ton, ex store.

LEAD, WHITE.—Quoted £38 per ton, ex store.

LEAD, ACETATE.—Rather cheaper quotations from the Continent. White crystals now quoted £44 per ton, c.i.f. U.K. ports. Brown on offer at £40 per ton, c.i.f. U.K. ports.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store, in moderate demand.

POTASH, CAUSTIC 88/92%.—Syndicate prices vary from £25 10s. to £28 15s. per ton, c.i.f. U.K. ports, according to quantity and destination. Spot material available at about £29 per ton.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

POTASSIUM CARBONATE.—96/98% quoted £25 5s. per ton ex wharf, early delivery. Spot material on offer at £26 10s. per ton ex store. 90/94% quality quoted £22 5s. per ton c.i.f. U.K. ports.

POTASSIUM CHLORATE, 98/100%.—Powdered quality on offer from the Continent at about £25 10s. per ton, c.i.f. U.K. ports; crystals, £2 per ton extra.

POTASSIUM NITRATE (SALTPETRE).—Spot material quoted £24 per ton, ex store. On offer from the Continent at about £21 15s. per ton, c.i.f. U.K. ports.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—On offer at 7d. per lb. ex store, spot delivery. Quoted 6¾d. per lb., ex wharf, early shipment.

POTASSIUM PRUSSIATE YELLOW.—In rather better demand. Now quoted 6¾d. per lb., ex store. Offered for prompt shipment from the Continent at 6⅜d. per lb., ex wharf.

SODIUM ACETATE.—English material on offer at £22 per ton, ex station. Continental quoted £18 15s. per ton, c.i.f. U.K. ports.

SODA CAUSTIC.—76/77%, at £17 10s. per ton; 70/72, £16 2s. 6d. per ton. Broken, 60%, £16 12s. 6d. per ton. Powdered, 98/99%, £20 17s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts, 20s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English price unchanged at 3½d. per lb., delivered.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality, £1 7s. 6d. per ton more. Alkali 59%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 per ton, ex station, minimum 4 ton lots. Pea crystals, photographic quality, £14 10s. per ton, ex store, spot delivery. Continental commercial crystals quoted £8 15s. per ton, ex store.

SODIUM NITRITE 100%.—Quoted £20 17s. 6d. per ton, ex store, spot delivery.

SODIUM PRUSSIATE (YELLOW).—Spot material unchanged at 4d. per lb., ex store. Quoted 3⅞d. per lb., c.i.f. U.K. ports, for prompt shipment.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption £3 10s. per ton, ex works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE—60/62%, solid, £13 5s. per ton; broken, £14 5s. per ton; flake, £15 5s. per ton; crystals, 31/34%, £8 12s. 6d. per ton. All delivered buyers' works U.K., minimum 5 ton lots with slight reduction for contracts; 60/62% solid quality offered from the Continent at about £8 15s. per ton, c.i.f. U.K. ports. Broken quality, 15s. per ton more. Crystals 30/32%, about £6 10s. per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £11 10s. per ton; roll, £10 5s. per ton; rock, £10 5s. per ton; floristella, £9 15s. per ton; ground American, £9 per ton, ex store, spot delivery. Prices nominal.

ZINC CHLORIDE.—British material, 98/100%, quoted £24 15s. per ton, f.o.b. U.K. ports; 98/100% solid on offer from the Continent at about £21 15s. per ton, c.i.f. U.K. ports. Powdered 20s. per ton extra.

ZINC SULPHATE.—Continental make on offer at about £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates

PARANITRANILINE.—1s. 9d. per lb. Fair home inquiries.

BENZOIC ACID.—1s. 8d. per lb. Some home inquiries.

CLEVES ACID.—2s. 3d. per lb. per 100%. Some home inquiries.

ACETANILIDE.—1s. 5d. per lb. Some home inquiries.

THE DEPARTMENTAL COMMITTEE which has been considering the practice of treating flour with chemicals, especially with regard to the question of public health, will not, it is thought, issue its report this year. It has been rumoured that a list will be compiled of substances which are regarded as innocuous, and that possibly it may be necessary for bakers and millers to declare the nature and amount of such substances used in the production of flour and bread.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, October 21, 1926.

The demand for chemicals on the Manchester market remains slow generally, with a quiet trade being done in one or two of the principal lines of heavies. Inquiries from home users are on much the same level as during the last month or two, whilst on export account actual demand is only very moderate. Price movements during the past week have been limited, and in some cases towards slightly lower levels, although, taking the whole range of chemical products, the market retains its steadiness. The Manchester Stock Exchange has again been busy with rumours coupling the names of Brunner, Mond and Co., Ltd., and the British Dyestuffs Corporation together, and the quotations for shares of these two concerns this week have been firmer.

Heavy Chemicals

Phosphate of soda values have steadied up a little to £12 10s. per ton, although the demand for this material remains restricted. Chlorate of soda is in limited request, with current quotations round 3⅛d. per lb. Glauber salts are unchanged at £3 15s., but there seems to be little expansion of buying interest. Sulphide of sodium is slow, and on the easy side, at about £7 per ton for commercial and £10 for 60 to 65 per cent. concentrated solid. Prussiate of soda keeps steady, and meets with a moderate amount of inquiry at 4d. per lb. The demand for caustic soda keeps up, and prices are firm at from £15 2s. 6d. per ton for 60 per cent. quality to £17 10s. for 76 per cent. Nitrate of soda attracts a certain amount of buying interest at £19 5s. per ton. Bicarbonate of soda is maintained at £10 10s. per ton, and a quiet demand is reported. Saltcake remains a quiet section at about £3 5s. per ton. Bleaching powder continues to be quoted at £8 10s. per ton, with sales much below normal. Hyposulphite of soda is steady at £9 10s. per ton for commercial crystals, and £15 10s. for photographic; but there is only a limited volume of business being put through. Alkali, 58 per cent. material, continues to be offered at round £6 15s. per ton. Bichromate of soda is rather quiet at 3½d. to 3¼d. per lb.

Yellow prussiate of potash meets with some inquiry, and values are held at 6¾d. per lb. Caustic potash keeps steady at about £27 per ton, and a quiet business is being done. For carbonate of potash a moderate demand is reported at £25 15s. per ton. Chlorate of potash is still on the slow side, but little change in values has occurred, from 3½d. to 3⅜d. per lb. still being quoted. Sales of permanganate of potash are limited with commercial crystals currently on offer at about 5d. per lb. and B.P. material at 6¾d. per lb. There is not much passing in the case of bichromate of potash but quotations for this remain at about 4d. per lb.

Sulphate of copper for shipment meets with a moderate inquiry with f.o.b. values fairly steady at £23 per ton. Offers of arsenic are limited and prices remain very firm in consequence, from £16 to £16 10s. per ton now being quoted for white powdered, Cornish makes, at the mines. Quotations for the acetates of lime keep up at about £17 10s. per ton for grey, and £8 for brown. The lead compounds are also well held at recent rates, although there is not a great deal of demand for these at the moment. White acetate of lead is being offered at £45 10s. per ton and brown at £41, with nitrate of lead quoted at about £41.

Acids and Tar Products

There is not much inquiry about for either tartaric or citric acids, but prices show little quotable change since last week, tartaric being offered at 11½d. and citric at 1s. 3¼d. per lb. Oxalic acid is also slow but steady at about 3⅝d. per lb. Acetic acid is unchanged in price and a quiet demand continues to be met with; glacial is offered at round £66 per ton and 80 per cent. commercial quality at £37.

On account of scarcity there is little actual business passing in the case of the by-products. Pitch, for shipment, ranges from £8 10s. to £9 10s. per ton, f.o.b., where export licences are obtainable. Creosote oil is also very firm at up to 8¾d. per gallon. There is little crystal carbolic to be bought and prices are high at about 5¾d. per lb. Solvent naphtha shows little change on the week at 1s. 11d. per gal.

Tower Dyeing Co.: Voluntary Liquidation

Pursuant to the provisions of the Companies (Consolidation) Act, a meeting of the creditors of the Tower Dyeing Co., Ltd., Tower Works, Radcliffe Hall, Radcliffe, was held recently at the Victoria Hotel, Manchester. Mr. A. Chadwick, the liquidator, submitted a statement of affairs which showed liabilities of £13,960 1s. 3d. That figure included trade claims of £4,062 11s. 10d., and a bank overdraft of £3,970 3s. 2d. The assets were estimated to realise £10,078 6s. 5d., less £349 8s. 7d. for preferential claims, leaving net assets of £9,728 17s. 10d., or a deficiency, so far as the creditors were concerned, of £4,231 3s. 5d. The creditors passed a resolution confirming the appointment of Mr. Chadwick as liquidator, and also elected an advisory committee, consisting of the representatives of Messrs. C. F. Milton and Co., Senior Brookes, and Bradbury, Saunders and Co. The committee were to assist in formulating a scheme, under which it was proposed that the unsecured creditors should receive a share of the face value of £1 in respect of each £1 of their claims, the share capital of the company not to be increased, but a transfer of the directors' holdings to take place. Certain liabilities, amounting to £5,917 6s. 3d., would be withdrawn, whilst the bank overdraft would be discharged and no claim made. The preferential creditors would be paid in full, and creditors for £40 and under would receive a composition of 5s. in the £.

Spanish Ban on Steel Imports

A deputation consisting of representatives of the Association of British Chambers of Commerce (including Mr. J. Payton, Birmingham) and of the Federation of British Industries met the President of the Board of Trade (Sir Philip Cunliffe-Lister) this week on Anglo-Spanish trade questions. The deputation placed before the President detailed information as to the difficulties at present encountered by British manufacturers and exporters in their export trade to Spain, especially as regards the Spanish Royal Decree of July 9, which raises great difficulties in the importation of steel into Spain. In this connection a letter has been addressed to the President of the Board of Trade by the Sheffield Chamber, urging the British Government to give notice to the Spanish Government, before October 23, of their intention to terminate the Anglo-Spanish Commercial Treaty now in operation between the two countries, at the expiration of the three years from its first ratification, namely, on April 23, 1927. Sir Philip Cunliffe-Lister replied sympathetically to the points raised.

Fuel Economy Engineers' Luncheon

Sir Robert Horne, M.P., was the guest at luncheon in London on Wednesday of the Institution of Fuel Economy Engineers. He dealt in his speech with the investigations and experiments which were being made to secure a better use of coal, and suggested that if success could be obtained, it would bring a happy era to this country. Sir Hugo Hirst presided. Discussing the production of liquid fuel by hydrogenation, low-temperature carbonisation, etc., Sir Robert told his audience that if they could bring about this great change in the use of coal by a device which they discovered and inventions which they brought to our aid they were going to change our present conditions of distress just as rapidly into a condition of happiness and prosperity as did the inventors of the early years of the last century. In that room there was possibly sitting a man who would perform that great service to his country.

Chemical Company Liquidator's Action

Mr. Justice Romer, in the Chancery Division on Monday, continued the hearing of the action by Mr. Thomas Robson, of Castle Street, Liverpool, as liquidator of Victors, Ltd., chemical manufacturers, of St. Helens, against Mr. Lingard, of King Street, Manchester, Mr. Harold Mare, and the Midland Bank, claiming a declaration that £30,000 debentures held by Messrs. Lingard and Mare, as the bank's nominees, were invalidly issued on the ground that the directors present at the meeting authorising the issue were not competent to vote. He also asked that the debentures and the memorandum of deposit be cancelled, and for an account of what was alleged to be due to the company by reason of the enforcement of the debentures. Mr. Robson said the unsecured creditors were supplying the funds to fight this action. The amount of the unsecured debts was £45,531.

Company News

DUBARRY PERFUMERY CO.—An interim dividend of 25 per cent. on the ordinary shares has been declared.

SUB NIGEL CO.—The accounts for the year ended June 30 last show a net profit of £114,564, making, with the balance brought forward, £131,479. After payment of dividends already announced, there remains an unappropriated balance of £24,286.

SADLER AND CO.—The net profits for the year ended June 30 were £12,905 and £9,098 was brought forward. A final dividend of 4 per cent. is proposed, making 7 per cent. for the twelve months, adding £7,500 to the depreciation fund, and carrying forward £5,037.

ANGLO-FRENCH PHOSPHATE.—The report for the year 1925 shows a credit balance, including £10,818 brought forward, of £19,206. The directors recommend a dividend of 4 per cent., leaving to be carried forward £11,706. The annual meeting will be held at Norwich House, Southampton Street, London, on October 26, at 12 noon.

SWEDISH MATCH CO.—It is announced that the interim dividend, due October 15, of five Swedish crowns per share, will be paid on and after October 26 at the exchange rate of 18·16 Swedish crowns to the pound (5s. 6·079d. per share less British tax) on shares registered in the name of Royal Exchange Assurance or Higginson and Co.

BURMAH OIL CO.—The directors announce an interim dividend of 2s. per share, or 10 per cent., less tax, on the ordinary shares, as compared with 2s. 6d. per share, or 12½ per cent., a year ago. The present dividend is payable on the capital as increased by the capital bonus of 33⅓ per cent. distributed in June, and is therefore equivalent to 2s. 8d. per share, or 33⅓ per cent., on the ordinary capital as existing a year ago.

UNITED STEEL COMPANIES, LTD.—The accounts for the year ended June 30 show that, after meeting debenture and obligation charges, setting aside £27,881 to reserve for sinking fund, allocating £95,212 to reserve in respect of United Strip and Bar Mills guaranteed preference dividend, and transferring £37,306 to the reserve against losses by subsidiaries, the credit balance of £823,912 brought forward was reduced to £520,909.

NORTH BROKEN HILL.—After providing for depreciation, taxation, etc., the net profit for the year ended June 30 last was £715,344. To this is added £472,413 brought forward, and £5,671 appropriated for new plant, and unexpended, making an available total of £1,193,428. Three dividends paid during the year absorbed £525,000, debenture sinking fund £13,333, and plant expenditure £50,000, leaving a balance of £605,095. Dividends and bonuses paid during the year amounted to £665,000.

ANGLO-PERSIAN OIL CO.—A final dividend of 12½ per cent., less tax, making a total for the year of 17½ per cent. on the ordinary capital, is announced, and £1,955,449 is carried forward. It has also been decided to recommend the capitalisation of £4,475,000 out of the general reserve fund, which now stands at £5,163,129 after the transference to it of £3,663,129 formerly standing at credit of share premium account and the allocation of £1,500,000 from the profits of the year, by the issue to the ordinary shareholders of one bonus ordinary share for each two ordinary shares held by them.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CEMENT.—A firm in Para (Brazil) is desirous of getting into touch with British manufacturers or exporters of cement, with a view to representation on a commission basis. (Repetition of Reference No. 371.) (Reference No. 515.)

ESSENTIAL OILS AND EXTRACTS, ETC.—A jobber and importer of drugs and druggists' sundries in Montreal desires to buy cash, against documents, job lots or seconds, of essential oils and extracts, drugs, etc. (Reference No. 496.)

Tariff Changes

AUSTRALIA.—Importation of certain organic compounds of lead: Customs Proclamation No. 127, dated August 23, 1926, prohibits the importation into the Commonwealth of Australia of organic compounds of lead intended for use in internal combustion engines unless the following precautions be observed, viz.:—(1) that such compounds are shipped in containers built so strongly as to prevent the possibility of breakage and leakage of contents; (2) that each container is clearly labelled or marked indicating that the contents are poisonous, and that every care must be taken to prevent the liquid from coming into contact with the skin, and the possibility of inhalation of vapours from the liquid.

NORTHERN RHODESIA.—Rebate of Customs duty: A Government Notice (No. 114 of 1926), published in the *Northern Rhodesia Gazette* for September 11, announces that a rebate of the Customs duty paid upon goods imported into the Territory will be granted when such goods are exported from the Territory, in the same condition as when imported, to any of the following countries, viz., Belgian Congo, Portuguese East Africa, Portuguese West Africa, Nyasaland and Tanganyika Territory. The grant of such rebate is subject to the provisions of existing regulations and to any further regulations that may be prescribed in the future.

ANGOLA (PORTUGUESE WEST AFRICA).—Import surtax: An Order has recently been issued providing for the imposition of a surtax of 2 per cent. *ad valorem* on all goods (except certain beverages, on which a specific surtax will be made) imported at Ambrizete, Santo Antonio do Zaire, and Noqui, irrespective of their origin. On articles imported by post the surtax will be 5 per cent. *ad valorem*.

DUTCH GUIANA.—New Customs tariff: The new Tariff, which came into force on July 15, provides for an increase of the import duties previously levied on chloral hydrate, sulphuric ether and similar products, spirits, certain medicines and certain oils, while the duties are reduced in the case of crude bauxite, gold, margarine, benzol, benzine and gasolene, and paints. Amendments are also made in certain cases by applying specific instead of *ad valorem* duties, or *vice versa*, to certain products, or by altering the unit on which duty is levied. The products affected include cement and trass, alcohol, crude mineral oil, pitch and tar and fats. Various products are added to the free list, viz., resin, lime (slaked lime and quicklime), and quicksilver. Particulars of the new duties may be obtained by persons interested at the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1.

FINLAND.—Tariff reductions (commercial agreement with Germany): Reduced duties are fixed for certain goods of German origin on importation into Finland by the Commercial Agreement between Germany and Finland which was signed on June 26. The Agreement has been enforced provisionally for three months as from October 1, by agreement between the two countries. The reduced duties are applicable to similar goods of United Kingdom origin imported into Finland. These goods include: amyl acetate; adronal acetate; methyl acetate; solvents of methanol, methyl acetate and acetone; phthalic ester; and the following synthetic tanning materials: liquid, Neradol N.D.; in paste, Neradol D.; solid, Neradol F.B.; Ordoval G., Ordoval 2G., and tanning material F.C.

Development of the Fischer Process

THE great activity shown by the I.G. in work on the liquefaction of coal, and its incursion into the coal trade by the acquisition of various coal mines, has induced the managers of some of the greatest Ruhr coal mines (Harpen, Kloeckner-Werke, Mannesmann, Koeln-Neuessen, Hibernia), as a measure of retaliation, to instal a trial plant for the production of synthetic liquid fuel on the premises of the Mont Cenis colliery. Contrary to the I.G., which will use the Bergius method, the coal industrialists intend to make use of the work of Professor Fischer, of Muelheim-Ruhr. If good practical results are really obtained, this method would be superior to that of Bergius, since it allows the preceding use of the coal for the production of gas. In case results of the trial are satisfactory, the Ruhr coal industry is reported to intend the erection of a gigantic plant for the liquefaction of coke, for which project the sum of £15,000,000 presumably will be needed.

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New Companies Registered

HENRY BELL, LTD. Private company. Registered October 13. Nom. capital, £10,000 in £1 shares. To acquire the business of manufacturer of and dealer in glue and chemical preparations, compounds and articles carried on by Henry Bell at Grantham. A subscriber: H. Bell, Shirley Croft, Grantham, Lincs. Solicitors: Hays, Roughton, and Dunn, 1, Martin Lane, London, E.C.4.

BIDSTON SOAP CO., LTD., 14, Miles Street, West Gorton, Manchester. Registered October 15. Nom. capital, £1,500 in £1 shares. To acquire the business of soap and chemical manufacturers now carried on by H. Ashcroft and E. T. Webb at 14, Miles Street, West Gorton, Manchester, as "The Bidston Soap Co." A director: H. Ashcroft, Broom Hill, Broom Lane, Higher Broughton, Salford.

HART CARBON FUEL, LTD. Registered as a private company on October 13. Nom. capital, £10,000 in 8,000 "A" shares of £1 and 40,000 "B" shares of 1s. The objects are to acquire and turn to account any process connected with the production, treatment, or commercial use of carbon or other fuel, etc. Solicitors: Pakeman, Son and Read, 11, Ironmonger Lane, London, E.C.

T. E. MANN AND CO. (1926), LTD., 82 and 83, Fenchurch Street, London. Registered October 15. Nom. capital, £5,000, in £1 shares. To acquire the business of glass and emery powder grinders and general merchants carried on under the style of T. E. Mann and Co., Ltd., at Kelland Road, Plaistow, and known as the East London Emery and Glass Mills, and to carry on the same and the business of pulverisers of rocks, shells, ores, slates, flints, emery, carborundum, silica and slags, manufacturers of enamels, varnishes, oils, paints, soaps, sodas, washing powders, disinfectants and inks, etc. Directors: L. G. B. Harrison, 105, Earlham Grove, Forest Gate, London, E.7; W. H. Cooke, and E. H. Varwell.

Case of Carbon Monoxide Poisoning

AN employee of the Anglo-American Oil Co., at their depot in the Crescent, South Road, Hockley, named Alfred Tinkler, (27), of 35, Kingscliff Road, Small Heath, was overcome by carbon monoxide fumes while cleaning a spirit tank on Saturday, October 16. He was imprisoned in the tank by bars which run diagonally inside. The tank, which was emptied of spirit the night before was about 6 ft. square, and the aperture through which the man entered it was about 18 in. across. The fumes had not left the tank during the night, and, while Tinkler was engaged in the process of scaling it, it was noticed that he was becoming overcome by the fumes. Several of his colleagues endeavoured to get him out, but owing to the obstruction caused by the diagonal bars within the tank, they failed. His condition was becoming serious, and the police and fire station were notified. When the rescue brigade, under District Officer Allen, arrived, they found that not only was Tinkler "gassed," but that several other employees were also suffering somewhat from the effects of the fumes. The brigade got to work, and, in a short time, they also were affected by the fumes. After about 20 minutes, however, they succeeded in getting Tinkler out through the hole. He was then in a semi-conscious condition. Tinkler was taken to the Birmingham General Hospital, and eventually allowed to go home.

Beneficiation of Low Grade Bauxite

AN investigation having in view the devising of methods of beneficiating low-grade bauxite so as to make deposits of such bauxite commercially available is being undertaken at the Southern Experiment Station of the U.S. Bureau of Mines, Department of Commerce, Birmingham-Tuscaloosa, Alabama. A large number of low grade bauxite deposits occur in the States of Alabama, Georgia, Mississippi, and Tennessee, but only a small proportion of these deposits have been exploited so far, on account of the excessive quantities of impurities with which the bauxite is contaminated. The impurities are principally silica, iron and titanium, and the main purpose of the investigation will be to find, if possible, some satisfactory way of eliminating these impurities.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

PHARMACOPEAN FORMUTAL, LTD., Vernon House, 40, Shaftesbury Avenue, W. (C.C., 23/10/26.) £25 8s. 4d. September 21.

SLATER, A., and ADAMS, E. (late trading as SLATER AND ADAMS), Avondale Road, Sparkhill, Birmingham, celluloid manufacturers. (C.C., 23/10/26.) £11 11s. 10d. September 9.

TRAVIS (S. H.) AND CO., 33-35A, King's Road, St. Pancras, chemists. (C.C., 23/10/26.) £25 13s. September 16.

Receivership

BOURNE JOHNSON AND CO., LTD. (R., 23/10/26.) A. E. Tilley, of 8, Staple Inn, Holborn, C.A., was appointed Receiver and Manager on October 13, 1926, under powers contained in debenture dated October 16, 1925.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

CARBON RESEARCH SYNDICATE, LTD., London, E.C. (M., 23/10/26.) Registered October 7, £1,000 debentures, part of £20,000; general charge. *£6,500. May 13, 1926.

CLIFFORD COVERING CO., LTD., Birmingham, celluloid manufacturers. (M., 23/10/26.) Registered October 7, £2,500 2nd debenture, to H. Joyce, 11, Augustus Road, Edgbaston, manufacturer; general charge (subject to 1st debentures). *Nil. January 30, 1926.

TAYLORS' DRUG CO., LTD., Leeds. (M., 23/10/26.) Registered October 8, £1,750 mortgage, to W. Ormerod, The Crossways, Leeds Road, Harrogate, J.P., and others; charged on 6, The Crescent, Hyde Park, Leeds; also registered October 9, £800 mortgage, to J. Simpson, Gordon House, Grindleford; charged on 2, Market Place Normanton. *£155,810 3s. 10d. September 27, 1925.

London Gazette, &c.

Company Winding Up

THE PRODUCE AND CHEMICAL CO., LTD. Meeting of creditors, October 28, 11.30 a.m., and contributories, October 28, 12 noon, 33, Carey Street, Lincoln's Inn, London, W.C.2.

Bankruptcy Information

BRIGGS, Percy, trading as CHARLES GREAVES, 217, Chester Road, Manchester, soap manufacturer and merchant. First meeting, October 26, 2.30 p.m., Official Receiver's Offices, Byrom Street, Manchester. Public examination, November 19, 10 a.m., Court House, Quay Street, Manchester.

HADDOCK, John, manufacturing chemist, lately 77, Whitehall Road, West Bromwich. First meeting, October 22, 11 a.m., Official Receiver's Office, 191, Corporation Street, Birmingham. Public examination, October 29, 11 a.m., Law Courts, Lombard Street West, West Bromwich.